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Federaal Kenniscentrum voor de Gezondheidszorg
Centre Fédéral d'Expertise des Soins de Santé
Belgian Health Care Knowledge Centre

BARIATRIC SURGERY IN BELGIUM: ORGANISATION AND PAYMENT OF CARE BEFORE AND AFTER SURGERY

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HEALTH SERVICES RESEARCH

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BARIATRIC SURGERY IN BELGIUM: ORGANISATION AND PAYMENT OF CARE BEFORE AND AFTER SURGERY

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LIST OF ABBREVIATIONS

ABBREVIATION	DEFINITION
BASO	Belgian Association for the Study of Obesity
BBAHS	Belgian Bariatric Allied Health Society
BCS	Body contouring surgery
BMI	Body Mass Index
BESOMS	Belgian Section of Obesity and Metabolic Surgery
BOMSS	British Obesity and Metabolic Surgery Society
BPD-DS	Biliopancreatic diversion with duodenal switch
CCGs	Clinical commissioning groups
CHC	Community Health Centre
CIO	Integrated centres of the management of severe obesity (France)
CSO	Centres Spécialisés de l'Obésité
GERD	Gastroesophageal reflux disease
GMD-DMG	Global Medical Record with the GP
GP	General Practitioner
GPP	Good-Practice-Point
DATO	Dutch Audit for Treatment of Obesity
DICA	Dutch Institute for Clinical Auditing
DSMBS	Dutch Society for Metabolic and Bariatric Surgery
EPR	Electronic Patient Record
FU	Follow-up
HCP	Health care professional
IMA-AMI	Non-profit organisation that manages and analyses information on all reimbursements related to the compulsory health insurance
LAGB	Laparoscopic adjustable gastric banding
MBS	metabolic and/or bariatric surgery

MDT	multidisciplinary/interdisciplinary team
NICE	National Institute for Health and Care Excellence
NOK	'The Nederlandse Obesitas Kliniek', Dutch Obesity Clinic
OECD	The Organisation for Economic Co-operation and Development
OSAS	Obstructive sleep apnoea syndrome
PCT	Primary care trusts
PMSI	Programme de médicalisation des systèmes d'information (Database in France)
PROM	Patient reported outcome Measure
RIZIV-INAMI	Belgian National Institute for Health and Disability Insurance
RYGB	Roux-en-Y Gastric Bypass
SCGs	Specialised commissioning groups
SG	Sleeve Gastrectomy
SNIIRAM	Système National d'Information InterRégimes de l'Assurance Maladie (database France)
SOFFCO-MM	Société Française et Francophone de Chirurgie de l'Obésité et des Maladies Métaboliques'
SOReg	Scandinavian Obesity Surgery Registry
WHtR	Waist to height ratio

SCIENTIFIC REPORT

1 INTRODUCTION

Disclaimer. This chapter makes extensive use of KCE-report 316.[1] Although we refer to this report, some of the sections included in this chapter are a complete reproduction of sections in KCE-report 316. Other sections are summarized, shortened and slightly adjusted.

1.1 Epidemiology of overweight and obesity

BMI as a proxy to identify overweight and obesity

Obesity is a condition in which fat accumulates in the body to a point where it may impair health.[2, 3]. The pathophysiology of obesity is an interplay between environmental factors (e.g. excess caloric intake and sedentary life style) with genetic factors. Nevertheless, obesity is considered as a preventable condition given that even with a genetic predisposition (apart from some rare monogenic diseases) a healthy lifestyle (diet and physical activity) can prevent obesity.

The Body Mass Index (BMI) is used as a proxy to identify overweight and obesity. It is calculated as weight in kilogram (kg) divided by height in meters squared (m^2). The World Health Organization (WHO) defines (for adults) a BMI of 25 to <30 kg/m^2 as overweight and a BMI ≥30 kg/m^2 as obese. The WHO further distinguishes obesity in obesity class I (BMI 30-<35 kg/m^2), class II (BMI 35-<40 kg/m^2) and class III (BMI ≥ 40 kg/m^2, or morbid obesity).[3, 4] For children the categorization is different.[3]

The BMI is a suitable measure to screen for obesity at the population level (for Western countries) since it is easy to measure (e.g. via health interview survey's or health examinations) and does not show clinical meaningful differences in the prediction of adverse outcomes compared to other measures.[5, 6] Nevertheless, the above BMI categories do not apply for all ethnic groups and BMI has limited diagnostic performance at the individual level (e.g. it does not take into account the type of obesity and underlying fat distribution).[7] In its guideline the National Institute for Health and Care excellence (NICE) recommended to also use waist circumference. The NICE guideline is currently being updated to evaluate if waist to height ratio

(WHtR) is superior to the other measures as new evidence and expert feedback suggests.[8]

Chronic conditions associated with obesity

Obesity is associated with considerable morbidity including type-2 diabetes, cardiovascular diseases (such as stroke and coronary artery disease), obstructive sleep apnea, ostheoarthritis, some sorts of cancer (e.g. oesophageal adenocarcinoma) and depression.[3, 9] The risk for these obesity related co-morbidities grows, with increases in the Body Mass Index (BMI):especially people with obesity category II (BMI 35-<40 kg/m²) and morbid obesity (BMI ≥ 40 kg/m²) are at increased risk.[3] The increased prevalence of comorbidities results in a reduction of life expectancy, and thus a higher early mortality risk. In a recent epidemiologic study, participants with overweight lost 1 disease-free year, the participants with mild obesity (Obesity category I: BMI 30-<35 kg/m²) 3 to 4 years, and the participants with severe obesity (Categories II and three combined: BMI 35 kg/m² or higher) 7 to 8 years compared with participants with a normal weight.[10]

The global burden of obesity increases

Across the OECD (The Organisation for Economic Co-operation and Development), 58.3% of the adult population has a BMI ≥25, including 23.2% who are obese (on average 23.1% of women and 23.2% of men are obese).[11] While the increase in some countries plateaus (at a high level), there is still a general increase in the prevalence of obesity observed around the globe.[3, 12, 13]

The burden of obesity is not only health related but has also an economic impact. It imposes a high economic burden on individuals, household budgets and nations. Besides the excess healthcare expenditure there are also costs associated with loss of productivity (lower productivity at work, loss of work days, permanent disability).[2]

Belgian figures on overweight and obesity

The latest available Health Interview Survey (2018) shows that 49.3%) of the Belgians have an excessive BMI (≥25) with 33.4% in overweight (BMI 25-<30 kg/m²) and 15.9% obese (BMI≥ 30 kg/m²).[14]

Excessive BMI is more prevalent among males (55.3%) compared to females (43.4%).[15] The prevalence of obesity (and overweight) increases with age: in the age category 15-24, about 24.7% has an excessive BMI (6.4% obese) vs 61.9% (22.8% obese) in the age group 65-74.

The prevalence of obesity increased over time.[15] Regional disparities (in favour of Brussels: with lower prevalence rates) and a socioeconomic gradient (i.e. more obese in socio-economic vulnerable groups) are observed.[15]

1.2 Management of obesity

1.2.1 Introduction

Prevention of obesity is key. The main treatment options for obesity are lifestyle interventions, pharmacotherapy (to a lesser extent) and bariatric surgery. The treatment options have to be aligned with the severity and duration of the obesity, the medical risk factors, associated coexisting diseases and functional limitations.[1]

Prevention of obesity

Obesity and overweight are considered as a condition that is, for the largest part, preventable (healthy diet and physical activity). It is therefore important that a policy context is provided where these preventive actions are made accessible to the general population.[3]

Lifestyle interventions

Lifestyle interventions are often referred to as the ‘conservative treatment’ and first option for weight management and obesity. It generally includes interventions that aim to change eating behavior, reduce energy intake (e.g. low-calorie diet: 1 200-1 500 calories/day for women; composition based on

patient's preferences and health status) and increase physical activity (≥150 min of aerobic activity per week).[16] Changing behavior requires high-intensity behavioral counselling (individual or in group) with the aim to provide patients with techniques (e.g. goal setting; regular recording of food intake, physical activity and weight; problem solving, assertiveness) for adopting dietary and activity recommendations.[9] There are comprehensive, multicomponent intervention programs which are given by trained professionals with frequent visits during a considerable time period (e.g. >14 visits during 6 months).[9, 16] Less intensive lifestyle counseling can be considered as a treating option for those who refuse to participate in these comprehensive programs or for those with a low health risk.[9]

Pharmacotherapy

Pharmacotherapy (e.g. orlistat[Xenical®/Orlistat®]; liraglutide[Saxenda®]) might be indicated as an adjunct to lifestyle interventions (e.g. when weight reduction is not obtained via lifestyle interventions alone). Yet, the role of pharmacotherapy in the clinical management of obesity to date has been limited.[1]

Metabolic and bariatric surgery

Bariatric surgery (BS) or "metabolic and/or bariatric surgery"[a] (MBS) is generally only advised as a treatment option for patients with morbid obesity (BMI ≥40 kg/m²) or severe category II obesity (BMI 35-<40 kg/m²) with comorbidities. MBS can only be considered as a 'second line' treatment option for severe or morbid obesity when important repetitive efforts to obtain durable weight loss through lifestyle modifications were unsuccessful.

Several types of bariatric surgery exist, with some procedures being abandoned for problems of tolerance, safety, and/or limited long-term efficacy while others are gaining momentum and becoming established like for instance the more recent laparoscopic Gastric Sleeve (Sleeve Gastrectomy or SG) beside the well-established laparoscopic Roux-en-Y Gastric Bypass (RYGB). Currently the SG and the RYGB are the two most commonly performed bariatric surgical interventions. The development of laparoscopic approaches since the mid-1990s, has significantly reduced rates of perioperative morbidity and mortality, so that nowadays almost all bariatric surgery is performed laparoscopically.[1] MBS can be restrictive, malabsorptive or mixed (combination of restrictive and malabsorptive surgery). Apart from their restrictive/malabsorptive nature, MBS interventions clearly also may act through complex physiological alterations in gastrointestinal hormones, weight regulation systems, including changes in hunger, satiation, taste and possibly energy expenditure.

The four mainly used bariatric surgery interventions are described below and depicted in Figure 1 [9, 17]:

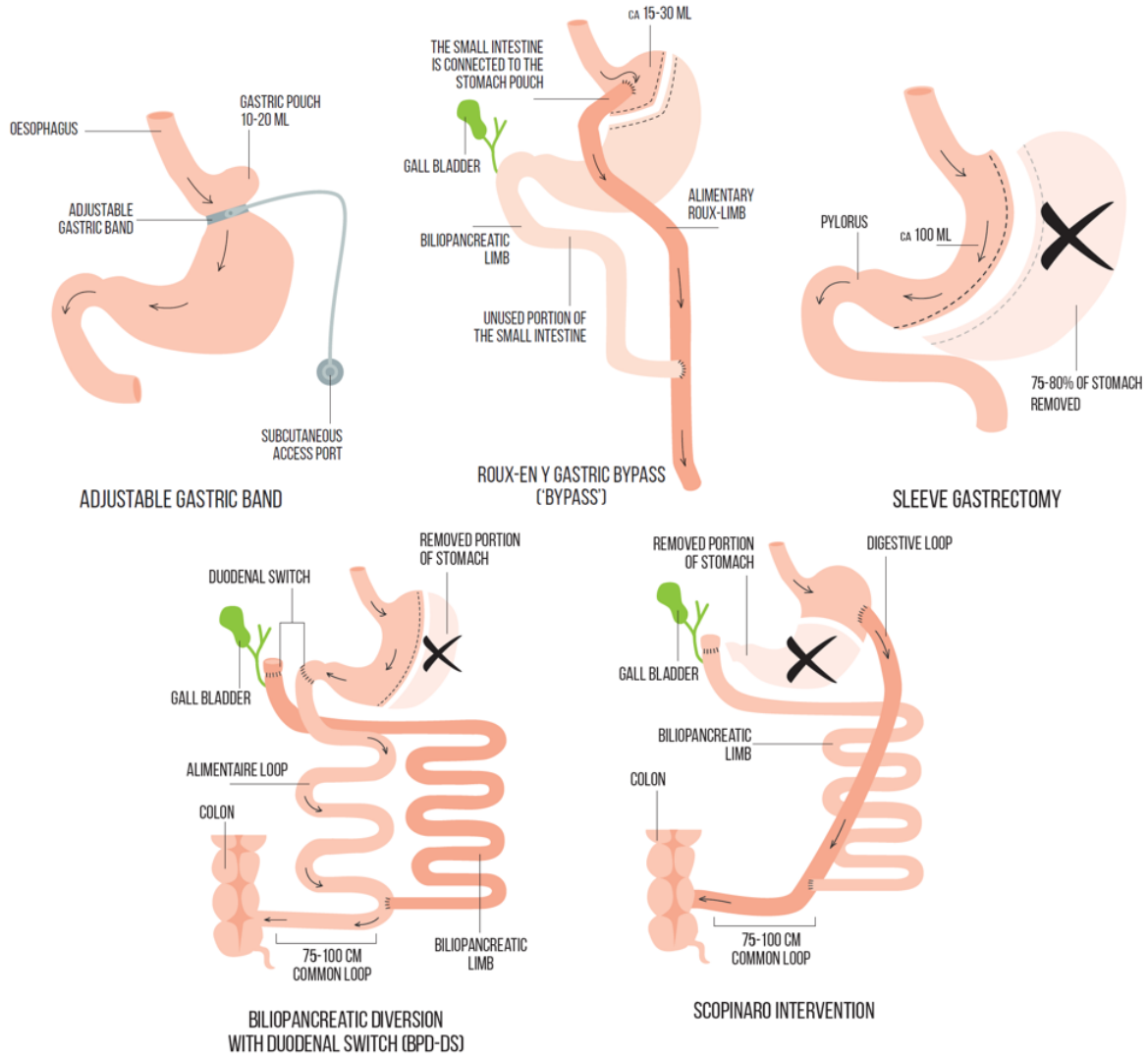
- Laparoscopic adjustable gastric banding (LAGB) involves the placement of an inflatable silicone band around the upper part of the stomach. This creates a pouch of approximately 30 ml which restricts the amount of food that a stomach can receive (increasing satiety mainly after ingestion of solid food). It doesn't cause anatomical changes and is thus reversible. LAGB does not reduce the absorption of calories and nutrients and is a purely restrictive MBS-intervention. Although it was frequently used until about 5-10 years ago, it becomes more and more obsolete for several reasons (e.g. lower efficacy than SG and RYGB; many problems of intolerance and/or complications on the mid- and long-term).
- Roux-en-Y gastric bypass restricts food intake by creating a small pouch (<50 ml) at the top of the stomach. This pouch is the only part of the stomach that receives food which greatly limits the amount of food a patient can comfortably eat and drink at one time. It is anastomosed to a Roux limb of jejunum. Food bypasses 95% of the stomach and the duodenum and most part of the jejunum. As a consequence, fewer

[a] Although the term metabolic surgery initially refers to bariatric surgery (BS) in obese type 2 diabetic patients, both terms are now very often used interchangeably. Therefore this type of surgery is also being named as metabolic and bariatric surgery (MBS). In this document the terms of bariatric surgery (BS), metabolic surgery and the more comprehensive term of metabolic and bariatric surgery (MBS) will be used interchangeably.

nutrients and calories are absorbed. Apart from its mixed restrictive-malabsorptive nature, this intervention also causes metabolic changes through changes in GI-tract hormones (e.g. Glucagon-like peptide-1 or GLP-1, influencing satiety, and improving glucose metabolism). It is reversible but a revision is far more complicated compared with LAGB. RYGB is an example of a mixed restrictive-malabsorptive intervention.

- Vertical sleeve gastrectomy involves the removal of approximately 70% of the stomach and is thus irreversible. The remaining section of the stomach is formed into a tubelike structure and cannot hold as much food. It causes acceleration of gastric emptying (rapid nutrient passage). It also leads to a decrease in the production of the appetite-regulating hormone ghrelin, which may lessen the desire to eat. Sleeve gastrectomy does not directly affect the absorption of calories and nutrients in the intestines. SG is an example of a purely restrictive intervention and is increasingly used. Since recently it is even surpassing the RYGB in many countries.
- Biliopancreatic diversion with duodenal switch or BPD-DS (modification of the biliopancreatic diversion procedure or Scopinaro, which is no longer used) involves a combination of a sleeve gastrectomy and a bypass of part of the intestine. BPD-DS (also referred to as ‘duodenal switch’) is only rarely used: as a surgical treatment of the super-obsese patients or sometimes as a revisional 'redo' bariatric intervention. The biliopancreatic diversion is only partially reversible.

Figure 1 – Schematic drawings of the LAGB, RYGB, SG, BPD-DS and Scopinaro intervention



While other surgical techniques exist, they are less frequently applied because they became obsolete (e.g. Scopinaro have been abandoned, because of 'too drastic' leading to important nutritional deficiencies) or are still in a relatively early phase of use (e.g. one-anastomosis gastric bypass (OAGB) also known as 'mini-gastric bypass'). Although the terminology suggests that OAGB is less invasive it is not.

The choice for the type of surgery is the result of several factors such as eating patterns and behavior of the patient, patient preferences, preference and experience of the surgeon, co-morbidities, BMI, willingness of the patient to take nutritional supplements, etc.

In addition, some other new 'less' invasive techniques are emerging. A variety of endoscopic treatments for obesity are in the stage of development. For some of them, short-term outcomes may appear promising but long-term results are lacking. As these techniques are new and given the limited experience with no or very few mid-to-long-term data on durability and safety being available, they are out of scope in this KCE report. An example is the endoscopic gastroplication realized via transoral gastroscopic access.

1.2.2 Effectiveness of bariatric surgery

Substantial weight loss

Based on an analysis of randomized clinical trials (RCT) the KCE report 316[1] concluded that weight loss after surgery is substantial and clearly higher when compared to conservative treatment (lifestyle interventions sometimes combined with pharmacotherapy). The weight loss is highest during the first two years post-surgery: on average about 18kg (1 year) and about 28kg (2nd year) more than conventional treatment. Absolute weight loss after bariatric surgery depends on baseline weight: 15 kg for persons with a BMI 30-35 kg/m² and 26 kg for persons with a BMI>35 kg/m². Weight loss is higher for RYGB and SG compared to LAGB. Observational data shows that the weight loss is, in most cases, durable. After 10 years or more there is still, in most cases, a substantial weight loss.[1]

Risk on obesity-related mortality

Based on observational studies it can be concluded that the relative risk of premature mortality due to obesity related conditions may decrease with 30-45%.[1]

Quality of life

The evidence on the effects on quality of life is limited (e.g. little RCT's, underpowered studies and lost-to follow-up). Based on the available studies it can be concluded that the physical aspects of quality of life (e.g. pain, general health) improves. Yet, the impact on the (long-term) mental aspects of quality of life is less clear.[1]

Obesity-related co-morbidities

Within the first two years post-surgery there is a remission[b] of Diabetes Mellitus (Type 2) observed in 55% of patients, versus in 8% of controls. Yet, remission rates decrease over time. About half of the operated patients that experienced diabetes remission relapse within 5 years. The effect seems to be the same for SG and RYGB.

The effect on hypertension is less clear-cut. While data from one RCT showed an improvement in half of the patients, this could not be confirmed by other trials. Nevertheless, also in the trials without a proven effect on hypertension it was demonstrated that the use of antihypertensive drugs decreased.[1]

Total cholesterol decreased more after surgery than in the control groups but this difference was no longer statistically significant at 3 years follow-up. Yet, five years after surgery a significant lower medication use (plasma lipids and lipid lowering drugs) was observed.

[b] 'Remission' does not equal definitive cure.

There are no good RCT data about the effect of bariatric surgery on 'Obstructive Sleep Apnea Syndrome' (OSAS). The only RCTs that exist are underpowered and only include LAGB (for which the effect on OSAS is assumed to be lower compared to RYGB and SG).[1]

Efficacy of bariatric surgery in adolescents

The effect of bariatric surgery on weight loss in adolescents seems to be comparable to that documented in studies in adults. Yet the evidence is only based on 1 RCT (LAGB versus conservative treatment, patients aged 14-18 years). Two years after surgery, the mean weight loss in the LAGB group was 34.6 kg (95% CI: 30.2-39.0), with a mean BMI change of 12.7 (95% CI: 11.3-14.2) kg/m². The study also showed an improvement in quality of life with a statistically significant difference at 2 years in scores related to Physical Functioning and Change in Health. No RCT data on other outcomes such as diabetes remission were identified.

Regarding short-term safety, available data, especially from observational studies, suggest also that the effects of bariatric surgery appear to be quite similar for adolescents, and adults. However, a simple extension of the indication of MBS to young adolescents is not easy and not always valid, due to a number of differences between these two populations. The scientific evidence is much more limited in adolescents and is mainly based on interventions in adolescents with a very high BMI, which were performed in specialized centres. Furthermore, it is not clear at what age a young adolescent can be considered mentally ready to make a therapeutic decision with a lifelong impact. In addition, many of these adolescents suffer from psychological problems, which often make decision-making even more difficult. The long-term effects on the effectiveness and especially on the safety of MBS in young adolescents are also not sufficiently documented to draw strong conclusions.

The threshold to opt for MBS in young adolescents should therefore be higher than in adults. The decision to perform the procedure should be guided primarily by the seriousness and necessity of the medical situation, rather than by age alone. Points for special clinical attention include growth and development, nutrient deficiencies, therapy and follow-up loyalty (compliance) and psychological health effects. Therefore, it was recommended to only conduct MBS in adolescents in very exceptional cases and only in specialized reference centres.[1]

Clinical effectiveness in patients with diabetes and a BMI 30-<35

RCT evidence of moderate quality suggests that the clinical effectiveness of MBS in adults with a BMI of 30-<35 kg/m² is similar than the evidence in adults with a BMI of ≥35 kg/m².

The KCE report 316[1] concluded that MBS may be considered as a treatment option in adults with type 2 diabetes and with a BMI of 30 - <35, who do not achieve durable weight loss and improvement of co-morbidities (including glycemic control) with accepted non-surgical methods. A reimbursement for the performance of this procedure in this population should be linked to a precise indication and follow-up in a specialized centre by a multidisciplinary team. Pending the results of the ongoing RCTs, the number of centres should be limited and a good record should be made of the indications, interventions and relevant follow-up data. Based on this, the future policy should be further supported and adjusted.[1]

Clinical safety of bariatric surgery

The decision to perform MBS cannot be taken lightly because it doesn't fix all problems (e.g. psychological problems, eating disorders) and requires life-long behavioural changes (diet and physical activity). Moreover, important side effects and complications might occur. Although on a population level the risk-benefit balance is positive, a long list of potential side effects and complications might occur at the individual level. It is important that patients are informed and educated about this as well as about the need to adapt their lifestyle.

The risks, side-effects, short- and long-term complications are described in-depth in KCE-report 316.[1] In this section we only describe some general and commonly reported problems:

- The risk of mortality during or shortly after surgery (within 30 days) is very low (0.1-0.3%) and comparable to other routinely conducted surgery.

- Short-term post-operative complications occur within 30 days after surgery. The most common complications are infection, bleeding, leakage or perforation, intestinal obstruction, deep venous thrombosis and myocardial infarction. In about 5% of the cases a readmission within 30 days is required to deal with these complications.
- Long-term complications and side effects are influenced by compliance with lifestyle behaviour and pre-existing conditions and nutritional deficits. The list of side-effects and complications is long and includes:
  - Gastro-intestinal problems such as gastro-oesophagal reflux (particulary after SG); cholelithiasis (increased risk during period of substantial rapid weight loss); early dumping syndrome mainly occuring after RYGB and characterized by gastrointestinal symptoms (abdominal pain, diarrhoea, borborygmi, bloating and nausea) and vasomotor symptoms (flushing, palpitations, perspiration, tachycardia, hypotension, syncope); chronic unexplained abdominal pain varying from slight discomfort to severe cramping and vomiting; acute internal herniation.
  - Metabolic and nutritional problems include late postprandial reactive hypoglycaemic syndrome or 'late dumping' (more often in case of RYGB); vitamine and micronutrient deficiencies of which Vit.D, Vit.B12 and iron (Fe) are among the most common ones and are frequently encountered both after RYGB and SG; (protein) malnutrition and the risk of decrease in muscle mass and strength;
  - Alcohol- and substance use disorder (especially after RYGB);
  - Psychiatric adverse effects and problems with psychological well being including problems with self-image, (re-emergence of) eating disorders, depression and a slightly increased risk on auto-mutulation and suicide;
  - Increased risk of changes in drug pharmacokinetics especially after RYGB. An example is the need to change contraceptive methods in women during childbearing age as a consequence of changed pharmacokinetics;
  - Pregnancy related outcomes. On one hand MBS is associated with an increased fertility and a reduced risk of adverse obstetric and pregnancy related outcomes (e.g. less pregnancy related hypertension, less gestational diabetes). On the other hand there are potential harms related to MBS (e.g. increased risk for pre-term delivery, small for gestational-age infants). A general recommendation is to post-pone pregnancy by at least 12-18 months after surgery.

It is clear that the list of potential side effects and complications is challenging in terms of follow-up requiring medical, behavioural, psychological and nutritional aspects of care.

1.3 Scope and research objectives

This research aims to assess the current organization of and payment for the care of bariatric surgery patients. We will focus on the pre-bariatric surgery consultation as well as on the follow-up post-discharge for adult patients. The care provided during the hospitalization period, as such is out of scope. The following research questions will be treated:

Research question	Methodology	Chapter
How is the care for bariatric surgery patients organised and paid for in Belgium?	Grey literature, site visits,	Chapter 2
Facts and figures about bariatric surgery in Belgium	Analysis of administrative databases	Chapter 2
Which are the best-practices, problems and unmet needs experienced by bariatric surgery patients?	Qualitative research with semi-structured patient interviews	Chapter 3
Which are the best-practices, problems and unmet needs in the care pathway of bariatric surgery patients as experienced by healthcare professionals?	Qualitative research with nominal groups	Chapter 3

Which are the key (organisational and) clinical interventions in the care process of patients undergoing bariatric?	Literature review of clinical guidelines and care pathways	Chapter 4
How is the care pathway for bariatric patients organised and paid for in a selection of countries?	International comparison	Chapter 5
Which policy scenarios can be formulated to improve the organization of and payment for the care of bariatric surgery patients in Belgium	Scenarios development and stakeholder analysis	Chapter 6

1.4 Key points

- **Obesity is a largely preventable chronic condition that is associated with co-morbidites such as diabetes, cardiovascular diseases, depression and osteoarthritis.**
- **The Body Mass Index is, although imperfect, still the most commonly used measure to identify overweight and obesity: overweight (BMI 25 to <30) and mild obesity (category I, BMI 30 to <35), severe obesity (category II, BMI 35 to <40) and morbid obesity (category III, BMI ≥40).**
- **The prevalence of obesity is increasing around the globe. In Belgium, ±16% of the adult population is obese. This tends to increase year-by-year.**
- **The treatment options for obesity are: lifestyle interventions in combination (or not) with pharmacotherapy and bariatric surgery. Lifestyle interventions are the first line treatment option. Bariatric surgery is (given the risk for side effects and complications) generally only advised when lifestyle interventions alone are not effective for people with morbid obesity or severe obesity with comorbidities.**
- **Bariatric surgery is more effective than non-surgical treatment options in achieving durable weight reduction. There are four main techniques: laparoscopic adjustable gastric banding or LAGB (restrictive); Roux-en-Y gastric bypass (mixed restrictive and malabsorptive); Vertical sleeve gastrectomy (restrictive) and Biliopancreatic diversion with duodenal switch (restrictive and malabsorptive). The LAGB is not frequently used anymore (because other techniques are more effective, and because the relatively high risk for long-term complications) and the biliopancreatic diversion with duodenal switch is only applied in cases of very severe obesity (because its invasive nature and high risk of side effects).**
- **Although the risk-benefit balance is positive on a population level a long list of potential side effects and complications on the short- and long-term might occur at the individual level. Since these problems concern a variety of domains (e.g. nutritional deficiencies, gastro-intestinal problems, surgical complications, psychological and behavioural problems) the organisation of follow-up care often is challenging.**

2 BARIATRIC SURGERY IN BELGIUM: ANALYSIS OF THE CURRENT BELGIAN SITUATION

2.1 Belgian criteria for reimbursement

Bariatric surgery is reimbursed in Belgium since 2007. The reimbursement is only performed when the following criteria are met[18-20]:

- Adults (≥18 years) with BMI ≥40;
- Adults (≥18 years) with BMI ≥35-39.9 with one of the following co-morbidities:
  - Diabetes treated with medication;
  - Therapy resistant hypertension (i.e. >140/90mmHg, despite treatment of at least 1 year with simultaneous use of at least 3 antihypertensive drugs);
  - Obstructive sleep apnoea;
  - Re-intervention after a complication or insufficient effect of the previous bariatric surgery intervention.
- Patient followed during at least 1 year a documented diet that was not successful on the long-term;
- Multidisciplinary communication in which besides the surgeon at least a physician specialized in internal medicine and a clinical psychologist or a psychiatrist participated. The report of this multidisciplinary consultation with a joint declaration about an indication for surgery is signed by at least the three, of the above mentioned, disciplines. This report is, together with the documented diet, to be found in the medical file of the patient.
- The treating physician will submit a notification form (outline as determined by the "Insurance committee of the RIZIV-INAMI") to the advising physician of the health insurance fund.
- The hospital keeps a registry (Modalities are defined by the "Insurance committee of the RIZIV-INAMI").

Table 1 – Billing codes for medical fees (Bariatric surgery)

Type of Bariatric surgery	Billing code	Start date	End date	Key	Coefficient
Gastrectomy (Mason, sleeve)	241776-241780	01/10/2007		N	400
Laparoscopic gastrectomy (Mason, sleeve)	241791-241802	01/10/2007	01/01/2012	N	400
Gastric banding	241813-241824	01/10/2007		N	400
Gastric bypass: Biliopancreatic diversion or gastrojejunal (Scopinaro, gastric bypass, duodenal switch)	241835-241846	01/10/2007		N	650
Laparoscopic gastric bypass: Biliopancreatic diversion or gastrojejunal (Scopinaro, gastric bypass, duodenal switch)	241850-241861	01/10/2007	01/01/2012	N	650

Note: for a list of billing codes for medical material and devices see INAMI-RIZIV (2018)[21]

2.2 Epidemiology of bariatric surgery in Belgium

2.2.1 IMA-AIM data

The IMA-AIM[c] is a non-profit organisation that manages and analyses information on all reimbursements related to the compulsory health insurance, collected by the Belgian sickness funds. People who are' entitled to receive reimbursed services from the Belgian sickness funds are called 'beneficiaries'.

These data cover all reimbursed services (consultations, pharmaceuticals, diagnostic and therapeutic procedures) and some patient socio-demographic characteristics as well as social security related data to the extent they influence reimbursement. In this chapter we use data from the IMA-AMI to describe the epidemiology of bariatric surgery, the caseload of hospitals, surgeons and GPs (general practitioner).

2.2.2 Evolution in the number of (first) bariatric surgery procedures

In Table 2 the evolution of metabolic and bariatric surgery over time is given. Only the first surgery (sleeve, LAGB or RYGB) per patient was considered in the analysis. Because the years 2007 and 2008 are part of a transition period (nomenclature for bariatric surgery started in 2007) and the care of self-employed people was not yet registered the graph only shows data from 2009 onwards. The number of primary bariatric surgery interventions increased from 7 552 in 2009 to 13 346 in 2017 which is the equivalent of 1.2 interventions per 1 000 insured persons. The increase in bariatric surgery utilization rates is much steeper in the period just after the introduction of the reimbursement compared to the three most recent years.[21-23]

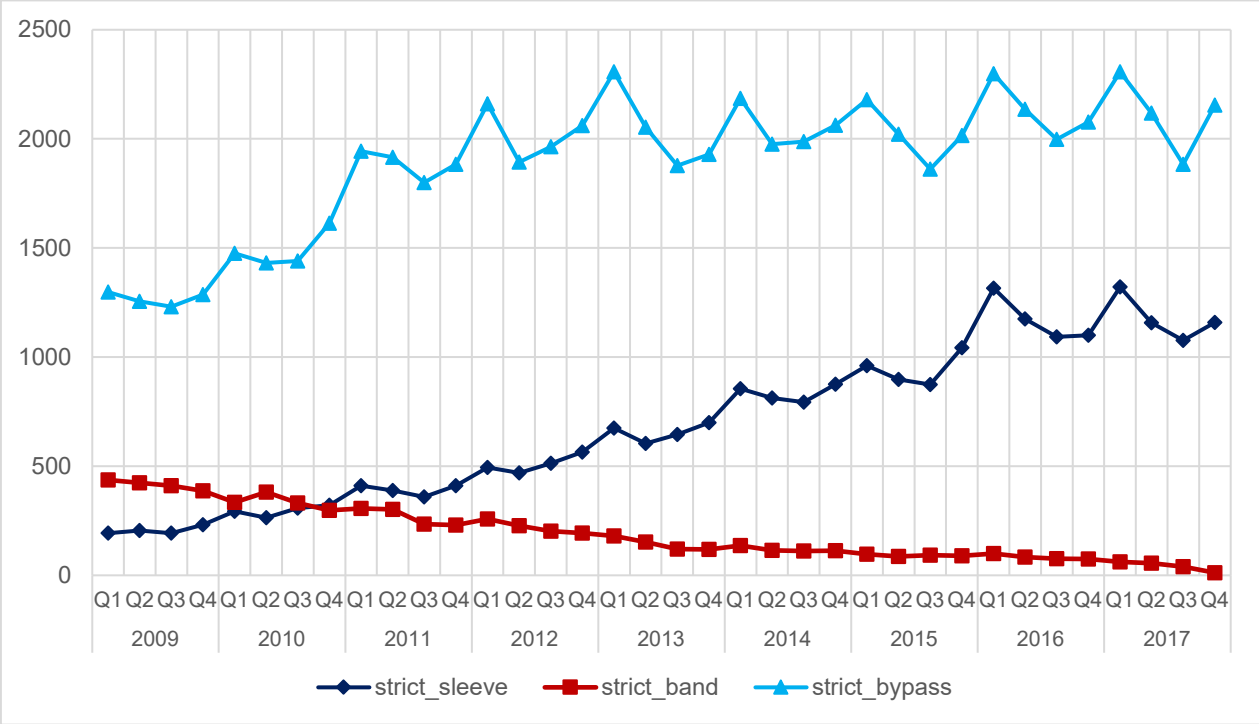
Table 2 – Evolution of bariatric surgery in Belgium (2009 - 2017): number of first surgeries since the start of the specific nomenclature in 2007

YEAR	SG	LAGB	RYGB	TOTAL
2009	824	1 658	5 070	7 552
2010	1 187	1 343	5 960	8 490
2011	1 569	1 073	7 542	10 184
2012	2 040	882	8 079	11 001
2013	2 624	572	8 168	11 364
2014	3 335	476	8 211	12 022
2015	3 775	366	8 079	12 220
2016	4 683	334	8 509	13 526
2017	4 714	168	8 464	13 346

In Figure 2 the number of first bariatric surgeries per quarter since 2009 is shown. As can be noticed the number of bypasses and sleeves has steadily risen over this time period, while bandings have become almost unused.

[c] IMA: Intermutualistisch Agentschap; AIM: Agence Intermutualiste.

Figure 2 – Quarterly year evolution of bariatric surgery 2009-2017 by procedure type



Overall increase but most pronounced in Wallonia

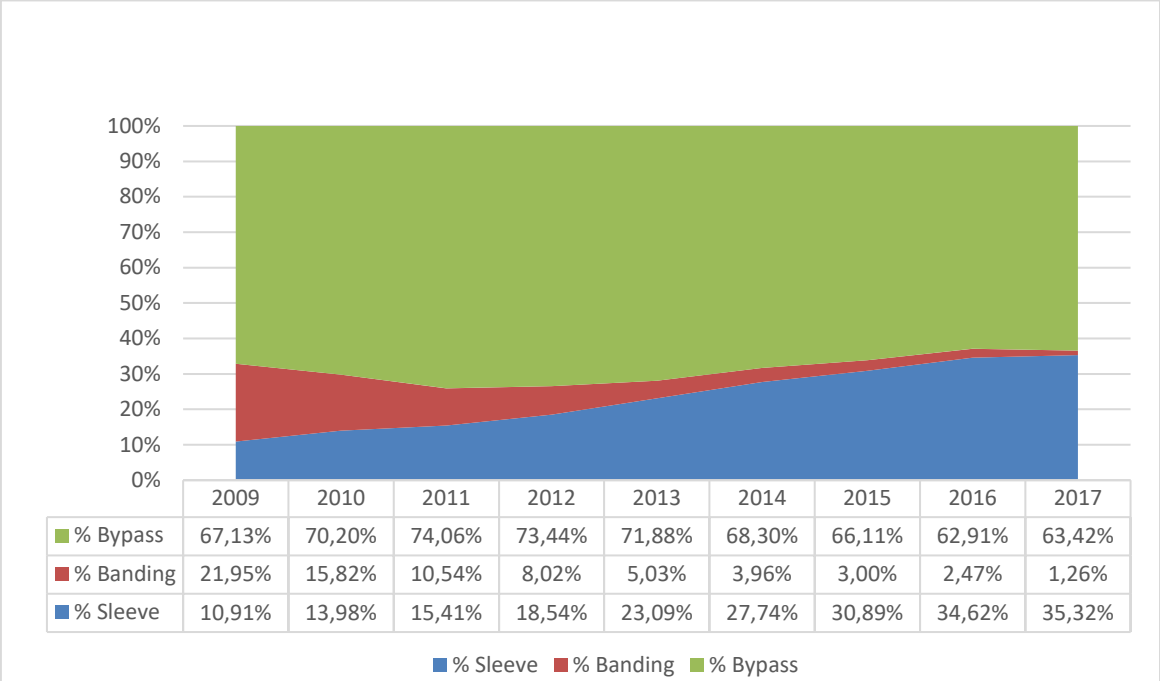
In the period 2009-2017 a yearly increase of surgeries of 7.5% was observed (totalling an increase of 76%). The yearly increase based on absolute numbers is the highest in Wallonia (9.2%) compared to Brussels (8.8%) and Flanders (7.4%). If we look at the average yearly increase based on the number of bariatric surgeries per 1 000 beneficiaries in the period 2009-2017 then the yearly increase is as follows: Wallonia 8.9%, Brussels 7.7% and Flanders 6.9%. In the three most recent years (2015-2017) the yearly increase is again the highest in Wallonia, followed by Flanders and Brussels. As such the regional differences become larger.

The use of RYGB and certainly sleeves increases while banding almost disappears

Over the period 2009-2017 the annual average increase in sleeves was 25% (total increase of 427%), and bypasses was 7% (total increase of 66%) while the average decrease of bandings was -24% (total decrease of -89%).

In Figure 3 the relative percentage in the use of sleeves, bandings and bypasses is given for this same 9 years period. In 2017, two-thirds MBS surgeries are a bypass and one third a sleeve. Bandings have become almost obsolete. There is practice variation in operation type across geographical areas (see below).[24]

Figure 3 – Percentage of sleeve, banding and bypass bariatric surgery options over time (2009-2017)



	2009	2010	2011	2012	2013	2014	2015	2016	2017
% Bypass	67,13%	70,20%	74,06%	73,44%	71,88%	68,30%	66,11%	62,91%	63,42%
% Banding	21,95%	15,82%	10,54%	8,02%	5,03%	3,96%	3,00%	2,47%	1,26%
% Sleeve	10,91%	13,98%	15,41%	18,54%	23,09%	27,74%	30,89%	34,62%	35,32%

2.2.3 Demographic information about bariatric surgery patients

Patients undergoing bariatric surgery are predominantly female (72%) and have a median age of 42 years (anno 2017). Males undergoing bariatric surgery are slightly older (median= 45) than females (median=41).

2.2.4 Prevalence of bariatric surgery since start nomenclature

About one percent of the total population has had a bariatric surgery

To estimate the number of people that have undergone bariatric surgery, we count all beneficiaries with at least one 'bariatric specific nomenclature code' since this was introduced (2007-2017). This estimate is lower than reality since also before that period, bariatric surgery was performed. In addition, the coding in the first two years (2007-2008)[d] was not yet adequate (inherent to introduction of new nomenclature) and self-employed people were not yet taken into account.

In the period from 2007 until 2017 there were 106 679 people with a bariatric surgery. From these, 103 961 (Bypass=70 363; SG=24 690; LAGB=8 638) were alive at the end of 2017 and insured in 2017 in Belgium. When we compare this to the number of all beneficiaries in 2017 (n=11 148 251) this accounts for almost 1% of beneficiaries.

Prevalence differs geographically

The distribution of patients who underwent a bariatric surgery from 2007-2017 and were alive and insured (in 2017), can be mapped per municipality of residence (in 2017) of the person. As can be seen from the left panel of Figure 4 in considerable parts of Belgium (all the light-red and dark red parts) the population with a bariatric surgery (with surgery being performed over a period of 11 years) exceeds 10 per 1 000 beneficiaries, or 1% of the population.

However there are differences in prevalence, depending on location: There are 45 municipalities in which more than 1.5% of the population received bariatric surgery, while there are 14 municipalities (cf. light yellow parts in figure) in which less than 0.5% of the population received bariatric surgery. The overall number of bariatric patients per 1 000 beneficiaries is 7 in Brussels, 8 in Flanders and 12 in Wallonia. All bariatric patients with a surgery in 2007-2017 in Belgium (100%) are distributed as follows: 7% in Brussels, 50% in Flanders, 42% in Wallonia and 1% with unknown address.

No clear relationship between geographical difference in bariatric surgery prevalence and location of hospitals

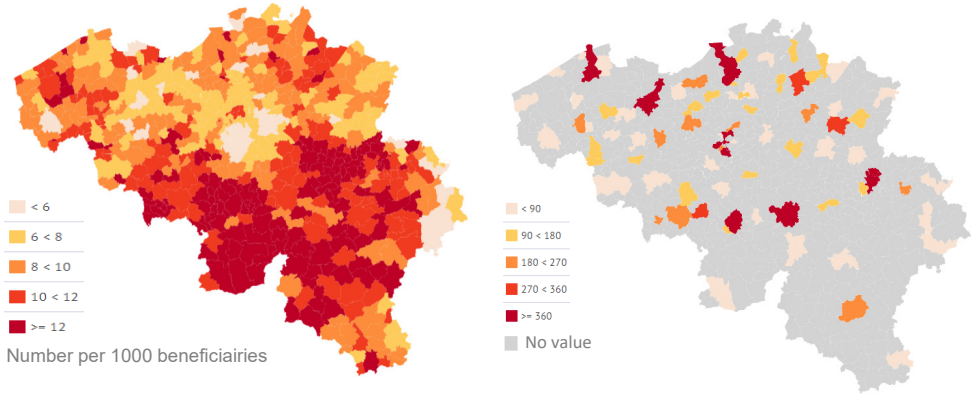
When comparing the place of residence with the location where surgery was performed in 2017 (cf. right panel in Figure 4) there is no evidence of a clear relationship. In 2017, among 140 hospitals[e] (see point 2.3.2), there were 100 hospitals that performed at least one bariatric surgery (10 in Brussels with 16.4% of BS's, 52 hospitals in Flanders with 46.8% of BS's, 36 hospitals in Wallonia with 36.8% of surgeries). These figures suggest that at least half of the bariatric surgeries performed in Brussels are actually performed on residents from Wallonia and Flanders. Also some of the municipalities in or close to Brussels have the lowest numbers of bariatric patients in the country. This implies that hospitals performing a lot of surgeries have patients from a wide surrounding area, and that patients are rather mobile and prepared to travel to undergo this surgery (but maybe not to go to the follow-up consultations).

[d] The reason why data from the years 2007 and 2008 were not included in 2.2.2. yet, in this section e are interested to estimate how many people in the population have already had bariatric surgery. Therefore, we included all cases for which we have data.

[e] This include psychiatric hospitals (102 of the 140 hospitals are acute hospitals).

Figure 4 – Geographical variation in beneficiaries with bariatric surgery (2007-2017)

All bariatric surgeries 2007- 2017 **All bariatric surgeries 2017 – hospital locations**



Legend: to the LEFT: Number of beneficiaries with a bariatric surgery in the period 2007-2017 ***per 1 000 beneficiaries*** *per municipality (NIS-code) in 2017, based on the place of residence in 2017. RIGHT: Number of bariatric surgeries in 2017 based on the hospital location in which the surgeries were performed.*

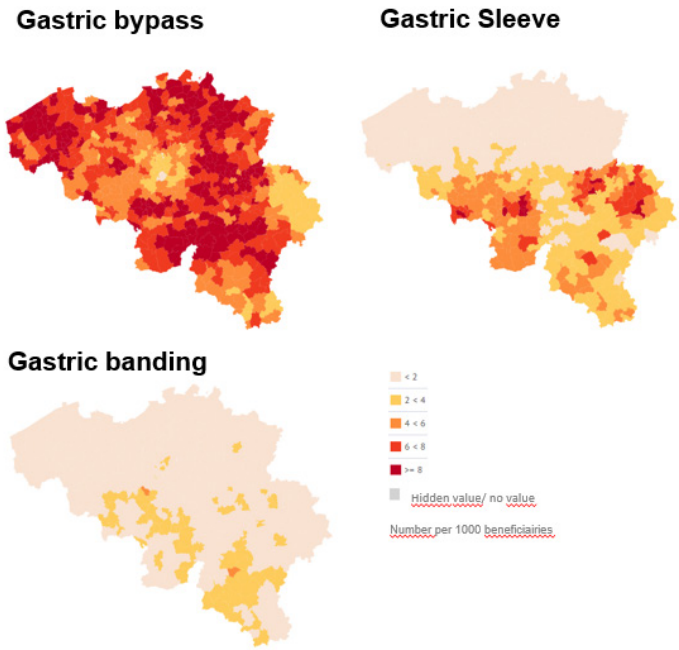
Regional differences in type of surgery

When we look at the different types of surgeries in Figure 5 it can be observed that gastric bypass patients are (with an exception for Brussels) spread relatively evenly across the country with an average number of gastric bypass patients per 1 000 beneficiaries of 3 in Brussels and 7 in Flanders and 6 in Wallonia (or 5% of all bypass patients living in Brussels, compared to 62% in Flanders and 32% in Wallonia).

This does not hold for the other two bariatric surgery types. Sleeves are clearly more performed on residents from Wallonia (5 in 1 000 beneficiaries, 51% of sleeve patients) than the rest of the country (respectively 2 in 1 000 in Brussels or 11% of sleeve patients, and 1 in 1 000 in Flanders or 21% of sleeve patients). Also gastric bandings are performed relatively more in Wallonia with an average of 1.3 per 1000 beneficiaries, than in Brussels (1.1 per 1 000 beneficiaries) and Flanders (0.5 per 1 000 beneficiaries) (of all banding patients, 15% live in Brussels, 34% live in Flanders and 51% live in Wallonia). The camel-colour areas are those where there live less than 6 bariatric patients (absolute number) in the whole municipality (by NIS-code[f]).

[f] The NIS-code (French: code INS) is a alphanumeric code to identify geographical areas in Belgium for statistics. The code includes 5 number (First refers to province; second to district; last three to municipality).

Figure 5 – Place of residence (2017) of people with bariatric surgery performed between 2007 and 2017



Legend from Left to Right 1) Gastric Bypass, 2) Gastric sleeve 3) Gastric banding, Proportion of beneficiaries by type of bariatric surgery in the period 2007-2017 per 1000 beneficiaries in 2017. Herein only beneficiaries who were alive and insured in 2017 were counted, and the most recent place of residence (Municipality in NIS-code) 2017 was considered.

This analysis is further confirmed by the overall numbers per province in Table 3. In the first 4 columns the total number of bariatric patients by province are shown. In the last 4 columns the average number of patients per 1 000 beneficiaries in 2017 is shown. From the table it can be seen that the province with the highest prevalence of bariatric surgeries is Hainaut with 14 bariatric surgery patients in 1 000 beneficiaries, followed by Liège, Namur and Luxemburg, all provinces in Wallonia. It is also clear that the type of surgery chosen is very different between provinces or regions, where for example Hainaut -the Walloon province with highest prevalence of BS has 6 sleeve patients per 14 BS patients, West Flanders only has 1 sleeve patient on 9 BS patients.

Table 3 – Bariatric patients (operated in period 2007-2017)

Region	Province	BS	Sleeve	LAGB	RYGB	BS /1 000	Sleeve /1 000	LAGB /1 000	RYGB/1 000
BXL	**-**	7 656	2 690	1 253	3 713	7	2	1	3
FL	**Antwerp**	15 459	843	746	13 870	8	1	0	8
	East Flanders	11 386	1559	736	9 091	8	1	1	6
	Flemish Brabant	7 867	1380	738	5 749	7	1	1	5
	Limburg	6 904	527	530	5 847	8	1	1	7
	West Flanders	10 418	870	208	9 340	9	1	0	8
WAL	**Hainaut**	18 335	7 216	1 976	9 143	14	6	2	7
	Liège	14 006	5 846	1 106	7 054	13	5	1	7
	Luxembourg	2 402	790	333	1279	11	4	2	6
	Namur	6 008	1 663	551	3 794	12	3	1	8
	Walloon Brabant	3 149	1276	456	1 417	8	3	1	4
ALL	**Belgium**	103691	24 690	8 638	70 363	9	2	1	6

Total number of bariatric patients per surgery type per province and average number of patients per surgery type per province. (*2007-2017, alive, insured and attributed in 2017, not living abroad with a known address) REMARK: In West Flanders there is only one CHC and this one has less than 6 BS patients, thus results are hidden.*

2.3 Organization of bariatric surgery

Disclaimer section 2.3. The research team undertook 6 site visits and semi-structured interviews (see appendix 1.1 for topic list) with healthcare professionals to familiarize with the topics and to learn about key problems on the field. In addition, a recent hospital audit (from the Federal public authorities: FOD-SPF; FAGG-AFMPS; RIZIV-INAMI) about bariatric surgery gives valuable insights about the strengths and weaknesses in the organisation of bariatric surgery in Belgium.[25] When information that was gathered during the site visits is used as a sole source in this chapter, it is explicitly referenced. The reader should be aware that (in absence of an additional reference to the literature or Belgian data) these perceptions are only based on observations and text quotes collected during the site-visits.

2.3.1 Pre-surgery care

Multidisciplinary intake can be provided to some extent

Several centres provide besides the intake consultations (with surgeon, dietician, psychologist and an internist) and standard examinations (e.g. blood tests, gastroscopy, echo abdomen), information sessions where patients receive information from the different healthcare professionals about obesity, bariatric surgery (technique, complications, side effects), behavioural change, diet, etc.[25] It is however questioned if the legally compulsory intake is everywhere taken seriously.[26] There is a lot to do in little (reimbursed) time (in 63% of the centres the pre-surgery pathway is less than 4 months long).[25] The role of the multidisciplinary team members is not always clear. For the psychologists, for instance, their role varies from a ceremonial one (only providing a signature), over a gatekeeping role (not allowing surgery in case of psychological contra-indications), to that of a coach (psychosocial support tailored to the patient's need). The pre-surgical psychological assessment is seen as important to prepare the post-surgery care.[26] Although dieticians take part in this multidisciplinary process, their implication is not reimbursed, nor compulsory.

Most patients are self-referred and the role of general practitioners is limited

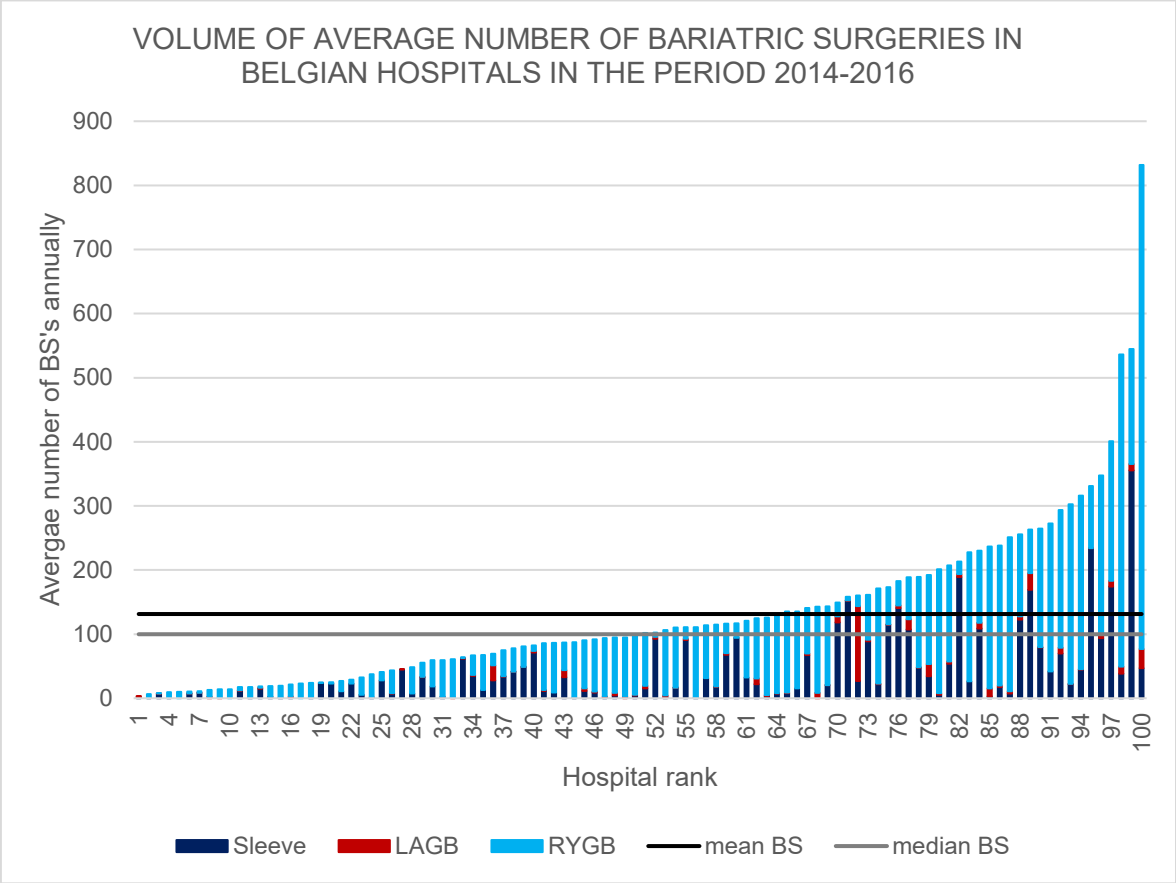
Most patients refer themselves to a bariatric surgery centre.[25] Some specialised centres indicate that they send a notification letter to the patients' GP but that it is too cumbersome to implicate them into the multidisciplinary concertation.[25] The centres that actively contact GP's (invitation to join the multidisciplinary concertation by letter and follow-up contact by phone) are the exception. *'Bariatric surgery centres state that GP's at best only participate in case of complex and complicated cases.(site visits)'* Many GP's regret that they are not formally implicated in the decision process about surgery. Since they have, in general, a broad view on the patients situation their advice could be relevant.[27] GP's indicate that the oversupply of bariatric surgery centres is a potential cause of not being involved in the decision making process. In addition, they state that the patient already made the decision themselves, and advice of the GP or another physician will not change this.

2.3.2 Distribution of bariatric surgery patients by hospitals and surgeons

Caseload and type of procedure differ across hospitals

There exists a large variability between hospitals in both the volume of interventions as in type of interventions that are used (see Figure 6)

Figure 6 – Volume of average number of bariatric surgeries in Belgian hospitals in the period 2014-2016



This figure is about the average number of all bariatric surgeries in Belgian hospitals, with the average taken over the 3 year time period 2014 until 2016. It includes only the surgeries reimbursed to beneficiaries of the Belgian healthcare insurance. The actual number might be higher since several centres also perform surgery on patients from abroad. It should also be noted that the data from one hospital might include different hospital sites. As such the caseload per hospital site (not available in the IMA-AMI data) might be lower.

- The average annual volume varies from 3.3 to 831.7 with an average of 131.36 (P50=99.85);
- Of the 140[g] hospitals in our list 40 hospitals did not perform any BS during 2014-2016, 100 hospitals perform at least 1 BS. The median is calculated based on the hospitals with at least an average annual volume of 1 BS in the period 2014-2016;
- Among the hospitals with at least 1 BS per year, 50 hospitals perform less than 100 bariatric surgeries annually (2 352 interventions or 18%) and 28 hospitals perform less than 50 bariatric surgeries annually (617 interventions or 5%). (see Table 4)

Not only caseload differ also the type of procedures vary significantly across hospitals. There is, for instance, one hospital in Brussels that performs gastric banding in more than 50% of the cases. In addition, there are hospitals which perform in more than 90% of the cases either gastric bypass or sleeve gastrectomy. As such it seems that hospitals tend to specialize in one of the bariatric surgery types.[23]

Table 4 – Average Number of interventions per hospital (annual average over period 2014-2016)

Mean N 2014-2016	N hospitals	%	Cum. N Hosp.	Cum. %	Mean Inter-ventions	%	Cum N	Cum %
1-50	28	28%	-	-	617	5%		
51-100	22	22%	51	50%	1 734	13%	2 352	18%
101-150	20	20%	71	70%	2 465	19%	4 816	37%
151-200	9	9%	80	79%	1 590	12%	6 406	49%
201-250	7	7%	87	86%	1 557	12%	7 963	60%
251-300	6	6%	93	92%	1 606	12%	9 569	73%
>300	8	8%	101	100%	3 616	27%	13 184	100%
Total	100	100%	-	-	13 184	100%		

g This include psychiatric hospitals (102 of the 140 hospitals are acute hospitals).

Caseload varies across surgeons

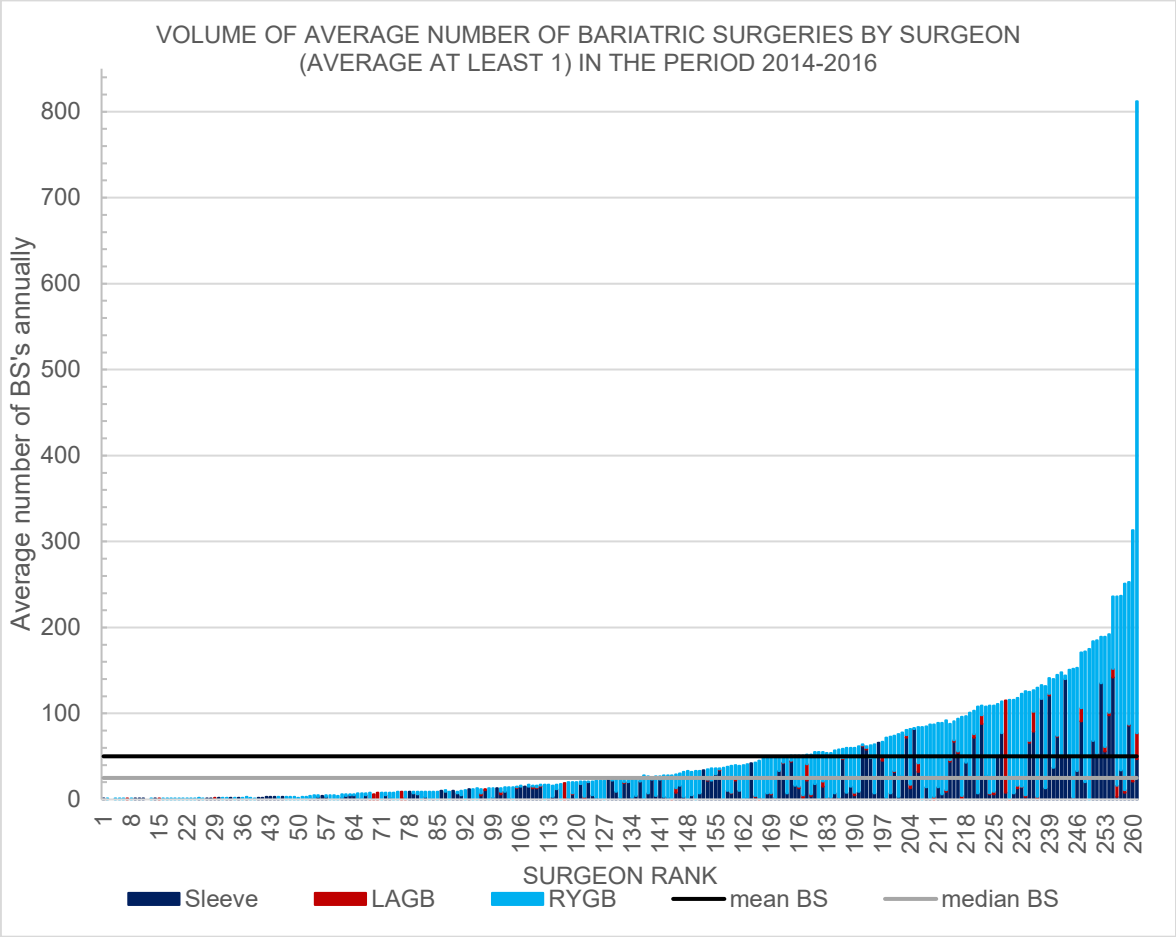
Also the caseload per surgeon differs.[28] '*Most consulted stakeholders acknowledge that a critical mass of patients is required to ensure that a multidisciplinary team with specific expertise is available throughout the entire care pathway.(site visits)'* In the period from 2014 until 2016 we evaluated the number of bariatric surgery interventions performed. Per surgeon, we only considered surgeries in which the surgeon was the head of the intervention. Here we consider all surgeries (not only the first surgery per patient). The annual amount of surgeries was averaged per surgeon in this time period in order to make results more robust.

We came to the following findings for the considered time period 2014-2016:

- 301 surgeons (100%) have at least one surgery in the entire period;
- 261 surgeons (86.7%) have a rounded average of at least 1 surgery annually (99.82 % of MBS);
- 131 surgeons (43.5%) have a rounded average of at least 25 surgeries annually (92.90% of MBS);
- 92 surgeons (30.6%) have a rounded average of at least 50 surgeries annually (81.37% of MBS);
- 43 surgeons (14.3%) have a rounded average of at least 100 surgeries annually (55.17% of MBS);
- 7 surgeons (2.3%) have a rounded average of at least 200 surgeries annually (16.07%).

In conclusion, the annual bariatric interventions per surgeon have a skewed distribution as shown in Figure 7. Furthermore it can be observed that surgeons performing many bariatric procedures have a large share of RYGB's. Most surgeons performed sleeves and RYGB's. Some surgeons also performed LAGB interventions, in which one surgeon single-handedly performs a quarter of all LAGB interventions.

Figure 7 – Volume of average number of bariatric surgeries by surgeon (with an average of at least one) in the period 2014-2016



In the period 2014-2016, 100hospitals performed bariatric surgeries, of which 87 hospitals had at least 2 surgeons performing bariatric surgeries.

When we consider all surgeries performed by a surgeon during the 2014-2016 period:

- 44 hospitals had at least 2 surgeons performing on average 25 MBS's annually;
- 24 hospitals had at least 2 surgeons performing an average of 50 MBS's annually.

When we consider only the in-house surgeries by a surgeon (i.e. surgery performed per surgeon per hospital) during the 2014-2016 period:

- 39 hospital had at least 2 surgeons performing an average of 25 MBS's in house annually;
- 20 hospitals had at least 2 surgeons performing an average of 50 MBS's in house annually.

2.3.3 Follow-up by Bariatric surgery centres

Length of hospital stay depends on patients and procedure

The national average length of stay in hospital for bariatric surgery interventions (DRG 403 Procedures for obesity) in 2017 was 2.8 days.(https://tct.fgov.be)[h] The length of stay increases with the 'severity of illness category or SOI': minor SOI: 2.5 days (78% of stays); moderate SOI: 3.2 days (21% of stays); major SOI: 9.1 days (1% of stays); extreme SOI: 32.1 days. The length of stay also depends on the procedure type: with a shorter length of stay for gastric banding compared to gastric bypass and sleeve gastrectomy.[23]

Content of the follow-up is highly variable

The follow-up care post-surgery seems to be heterogeneous. In 2015, a Belgian study described the current status of the care as well as the barriers for bariatric patients before and after surgery. This study was based on semi-structured interviews in a sample of twelve Flemish hospitals.[29] It illustrated that there is a large variation between centres in the care pathways. Examples are the extent and timing of biochemical screening, timing of initiation and duration of multivitamin supplements, medication adjustments (e.g. NSAID-use), involvement of a multidisciplinary team, degree of discussing the eligibility of patients for bariatric surgery in a multidisciplinary team meeting (all cases, doubtful cases, only via medical records), role of general practitioner (GP) in follow-up. Also GP's report that the follow-up between centres is not well structured and varies between centres.[30] Based on the study results, the authors concluded that strategies to implement existing guidelines are required in order to obtain more uniform, multidisciplinary support for bariatric patients, resulting in an increase of efficiency and improved patient care.[29]

Support from psychologists and dieticians is not reimbursed. *'The estimated amount for intake consultations varies between 25-50 € per discipline (dietician and psychologist). Follow-up appointments are generally cheaper and are estimated to cost between 25 and 40€ per visit. While information sessions are free in most hospitals, some also charge a fixed amount (e.g. 30-40€). (site visits)'* Some health insurance funds reimburse (via the additional health insurance) part of these patient costs.

Stakeholders all acknowledge that psychologists and dieticians have an important role in the follow-up care. Because of the lack of reimbursement the intensity and frequency of the interventions by these healthcare professionals (and the compliance by patients) is highly variable.[25] In some centres consultations with psychologists and dieticians, for instance, are

[h] The "Technical Cell – Cellule Technique" created in the Law of 29 April 1996, is a common service of the RIZIV–INAMI and FPS Public Health. Its mission is to collect, link, validate, anonymize data relating to hospitals. The TCT links the Minimal Hospital Data (MZG-RHM) to the Sickness Funds reimbursement data in hospital for the analysis of links between the expenditures of the health care insurance and the treated condition and for the elaboration of financing rules, accreditation standards and quality conditions in the context of an effective health policy.

standard practice and often with financial contribution of the physicians (via deductions on physician fees). In other centres this multidisciplinary follow-up is not or only partially available (e.g. no dietician in the team) or only on demand (e.g. in case psychological vulnerability is assessed by the surgeon or by the psychologist during a pre-surgery consultation). While everyone acknowledges the importance of physical activity, exercise programs (reimbursed via physiotherapy sessions) are not available everywhere. Furthermore, when they are organized, it is only a small portion of the patients that participate. Also the prescriptions of nutritional supplements differ by centre.[25]

We also found a large variability in lab tests (see Supplement: Appendix to Chapter 2; section 1.3).

2.3.4 Role of General practitioners

2.3.4.1 The current role of GP's in aftercare is limited

Link between primary and secondary care is not optimal

As is the case during the pre-surgery period, also post-surgery the link between GP's and specialists performing the surgery is limited.[31] Although there is, in most cases, written communication between the specialized bariatric centres and the GP, the GP's indicate that there is too little guidance about follow-up. Improving the written guidance in combination with invitation for multidisciplinary consults by the specialized centres is advocated by GP's.[27]

'*The lack of knowledge about bariatric surgery among general practitioners and other primary care providers (e.g. dieticians) was repeatedly mentioned during interviews with healthcare providers working in hospitals. Yet they all acknowledge that GP's have a role to play in the long-term follow-up. (site visits)'* After all, with the increasing utilization rates, the caseload becomes too high to be followed up by specialized centres alone on the long-term. In some areas there are lists of dieticians and psychologists specialized in obesity available.

General practitioners focus on blood tests to screen for nutritional and metabolic problems

GP's attribute an important role to themselves in the follow-up of bariatric surgery. Nevertheless, only few patients visit the GP specifically in the context of bariatric surgery follow-up. They consult the GP's for other reasons. What's more, recent (mainly qualitative) research pointed out several shortcomings.

GP's acknowledge that they have (too) limited knowledge about the benefits (e.g. weight reduction, health gains), disadvantages (e.g. complications, post-operative mortality, psychological consequences) and important aspects in the follow-up of the different types of bariatric surgery.[27, 32] The general practitioners do not systematically screen for surgical complications such as diarrhoea, vomiting or intra-abdominal pain since they assume that patients with such complaints will report these symptoms to them spontaneously. Also the GP's acknowledge that they have a lack of knowledge about the implications of bariatric surgery on, for instance, anti-conception, pregnancy, medication use (e.g. avoid the use of NSAID's), etc.[27]

The focus in the follow-up care is on blood tests (e.g. vitamin B12; Calcium) to screen for metabolic problems or nutritional deficiencies. Nevertheless, GP's admit that they order blood tests without guidance (and knowledge) about what should be monitored.[27]

Although there is limited evidence about the follow-up care interventions (see Chapter 0), a recent practice guidance for GP's was published.[31]

Table 5 – Key messages regarding follow-up care of a recent publication for GP's with practice guidance for bariatric surgery patients

Key message	Level of evidence
Acute, severe abdominal pain or gastro-intestinal symptoms (e.g. nausea, vomiting, abdominal pain, constipation, diarrhoea) require additional investigations. Intestinal obstruction, internal herniation, biliary disease (e.g. cholelithiasis) are important causes of re-interventions.	GRADE 2B
Gastro-intestinal complaints (e.g. vomiting; gastro-oesophagal reflux, dysphagia) after gastric banding require radiological investigation since it can be link to a too strong inflation or erosion of the gastric band.	GRADE 2B
Yearly evaluation of nutritional deficiencies. Most common are anaemia due to iron deficiency and vitamin D deficiency	GRADE 1A
Minerals and vitamins needs to be monitored together with urea, electrolytes and red blood cells : • **After 3, 6 and 12 months (red blood cells, creatinine, Na, K, liver function, ferritine, foliumacid, calcium, vitamin D, parathyroidhormone** • **After 6 and 12 months (but not in case of intramuscular injection) vitamin B12** • **Disease-specific tests (e.g. HbA1C in case of diabetes, ..)** • **In case of additional complaints (e.g. vitamin B1 in case of Wernicke encephalopathy, Korsakov, peripheral neuropathy)**	
Re-evaluate during the first two years post-surgery the indications of the home medication	GRADE 2B
Avoid the use of NSAID's since they increase the risk of damaging the anastomosis	GRADE 1B
All patients require supplements of vitamins post-surgery	GRADE 1A
With daily requirements of copper (2mg/day). Post LAGB no additional supplements. After Roux-and-Y and laparoscopic sleeve gastrectomy additional supplements are required: 200mg iron sulphate on a daily basis, intramuscular injection with 1 mg hydroxobalamine (vitamin B12) and 800mg calcium and 20 micrograms of vitamin D every 3 months	GRADE 2C
During assessment and clinical investigation post-surgery attention should be paid to the following: symptoms of nutritional deficiencies such as hair loss, neuropathic symptoms, dermal lesion, muscular weakness, etc.	GRADE 2C

Source: De Smet et al. (2017)[31]; Level of evidence GRADE; A (high); B(moderate); C (low); 1 (strong recommendation); 2 (weak recommendation)

2.3.4.2 *Distribution of bariatric patients by GP practice-type*

Based on the IMA-AMI data, we estimated the number of patients that have undergone bariatric surgery among the caseload of GP's. This calculation is performed according to the different types of GP practices (see Box 1). .

Box 1 – Payment systems primary care

The GP-practices or centres of primary care have two types of payments system:

- Fee-for-service payments which are adopted in the solo practices and the group practices, either on a single location (GR-S) or on multiple locations (GR-M), and
- Capitation payments, which are lump sums per patient per month, and which are used in the Community Health Centres (CHC's).

REMARK: Sometimes group practices with a social program and without lucrative purpose are also considered CHC's, however when they do not use capitation they are considered in the same way as other group practices in this analysis.

- A Community Health Centre (CHC, *Medisch Huis, Maison Medical*) is a legal definition of a specific type of primary care facility. Depending on the region (Flanders, Wallonia or Brussels) different prerequisites apply. In CHC's there are usually general practitioners, physiotherapists and nurses working together in one centre of primary care. For all patients subscribing to an CHC a lump sum is invoiced monthly depending on the patient condition, but not on whether or not he/she visits the CHC. In principle GP's working in an CHC cannot invoice separate acts. In principle the patient should seek care in the CHC, however when he or she sees another GP outside of the CHC with accountability, he/she is refunded by the CHC.

The distribution of bariatric patients by general practitioner practice can only be made based on patient-physician contact information. The most recent information available for this relationship is 2016. Therefore all further in-depth analyses are based on the figures from 2007 until 2016 only.

The total number of active practices was 10 867 for all Belgian patients in 2016 according to the IMA-AMI algorithm (cf. Box 2,) based on Personal Medical File, the number of contacts or conscription to an MCC.

Box 2 – The IMA-AMI algorithm for attribution of patients to a GP practice

Patients are attributed to a unique GP practice based on the following heuristic of priority:

- Patient has his 'Global Medical Record' (GMD-DMG) at a practice based on GMD-DMG- or CHC-forfait- nomenclature in the current year:
  - Remark: Normally the GMD-DMG is attributed to the first contacted GP-practice per year;
  - If the patient has >=6 months subscribtion to a CHC this is considered as having a GMD-DMG at this CHC practice;
  - If the patient has both a GMD-DMG based on GMD-DMG-nomenclature and the >=6 months subscription then the patients is attributed to the GMD-DMG-nomenclature practice;
- Patient has no current year GMD-DMG but has regular contacts in the current year with a GP-practice
  - CHC-subscription months *('forfaits medische huizen')* are considered equal to regular contacts
  - If a patient sees 2 practices with same frequency (regular contacts or CHC subscription months) then first contacted practice is prioritised.

- If patients has no current year GMD-DMG nor regular contacts nor CHC subscription months, but had previously a GMD-DMG based on classical GMD-DMG-nomenclature then he can still be attributed to a GP-practice based on the GMD-DMG-nomenclature of the current year-1, or the current year-2.
    - REMARK: All patients with GMD-DMG-nomenclature in years y-2, y-1 and y, or with regular contacts in year y are considered. All general practitioners with at least one patient based on these criteria, are considered. If a GP is active in several practices the following heuristic is adopted: GR-S > GR-M > CHC > solo, with oldest starting date.
    - REMARK: When a patient was not subscribed to the CHC for 6 months, did not have a GMD-DMG at another practice but on the contrary did have most contacts with a general practitioner who worked in an CHC during that year, he is considered separately from the other subgroups of patients

Distribution bariatric patients by GP practice-type in Belgium

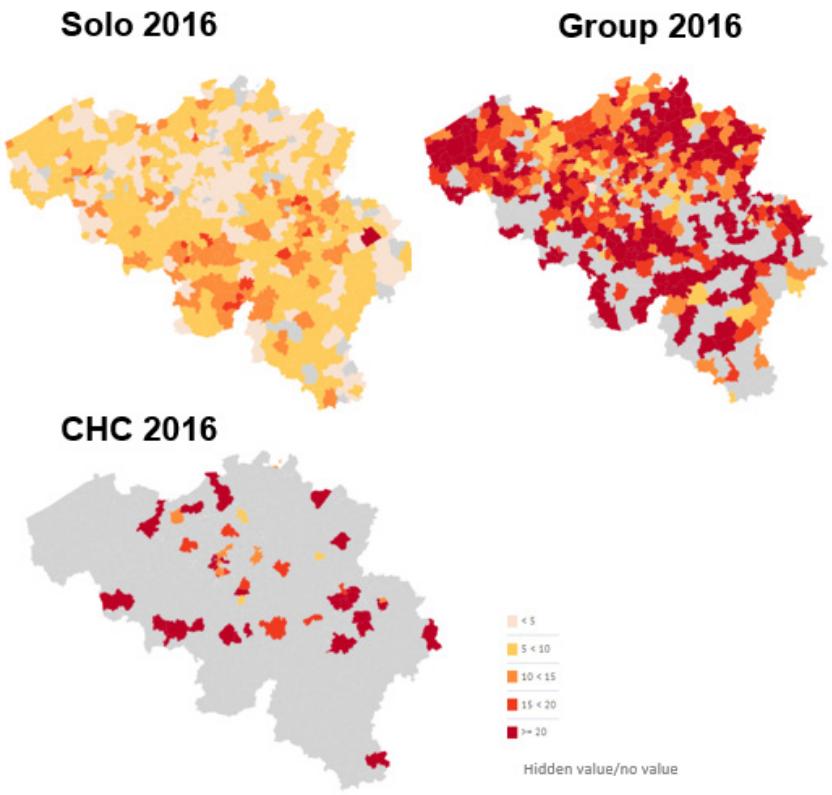
- Of all bariatric patients on average 55% visit solo practices, 40% group practices, and 5% CHC's. This is more or less similar to the overall patient population (51% visits solo practices, 44% group practices, and 4% CHC's).
- When the ratio of bariatric patients to all patients is compared between the various practice types (see appendix 1.2) we observe the highest ratio of bariatric patients in the CHC's (1.03%) compared to 0.96% in solo practices, 0.83% in group practices (0.91 in GR-M's and 0.81% in GR-S's); the global ratio in 2016 is 0.9% of the GP contact population.
- The general number of all patients (so not only bariatric) is highest in solo practices (4 960 760 patients), followed by the group practices (4 236 492) (of which there are 3 491 485 patients on one location and 745 007 patients in the group practices on multiple locations) and the CHC's (377 596 patients).
- The general number of bariatric patients follows the same logic with highest number in solo practices (47 494 patients), followed by the group practices (35 019 patients, of which the group practices on one location account for 28 224 patients, while the group practices on multiple locations account for 6 795 patients) and the CHC's (3 874 patients).

Table 6 – Distribution bariatric patients per GP-practice type

Overview

- In the period from 2007 until 2016 there were 93 333 bariatric surgery (BS) patients, of which there were 92 349 BS patients alive and of which 91 674 BS patients were alive and insured in the Belgian Healthcare insurance in 2016 (accounting for 98.2%)
- Of the alive and insured BS patients, 86 436 BS patients were also assigned to a general practitioner according to the IMA-AMI algorithm (94.3% of living and insured), and 6 897 BS patients were not (5.7%).
- These 86 436 attributed BS patients accounted for 0.84% of the insured Belgian population which totalled 11 101 464 in 2016.
- Of these 86 436 attributed BS patients there were
  - 59 756 BS patients with a RYGB (69.1%),
  - 8 754 with a sleeve (21.1%), and
  - 7 920 with a LAGB (9.2%).
- Of these 86 436 attributed BS patients,
  - 47 494 BS patients (55%) were attributed to solo practices,
  - 35 019 BS patients (40%) were attributed to group practices and
  - 3 874 BS patients (5%) were attributed to Community Health Centres (CHC's).
  - This distribution is similar as for the general population (52% solo practices; 44% group practices; 4% community health centres)

Figure 8 – Distribution of patients with a bariatric surgery in the period 2007-2016, who were alive, insured and attributed to a general practitioner practice in 2016



This is the average number of bariatric patients per GP practice in the municipality, with a split depending on the type of GP practice.

The distribution of BS patients by GP-practice type by municipality (NIS-code) can be seen Figure 8. The average number of bariatric patients by practice in Belgium is 6 in solo practices (Brussels: 4, Flanders: 5, Wallonia: 7), 20 in group practices (Brussels: 16, Flanders: 19, Wallonia: 25) and around 24 in CHC's (Brussels: 19, Flanders: 22, Wallonia: 28).

A numeric representation of the distribution of bariatric patients by practice type for each province is added in Table 7.

Not all GP's with contacts are 'active GP's. Therefore, when we apply a minimal activity of 200 contacts (entire population) a year per GP, the average number of BS patients in Belgium is 7 per solo practice. When we only consider GP's with minimally 1 BS patient, than the average is 9 per solo practice.

Table 7 – Number and average number of bariatric patients by practice type per province.

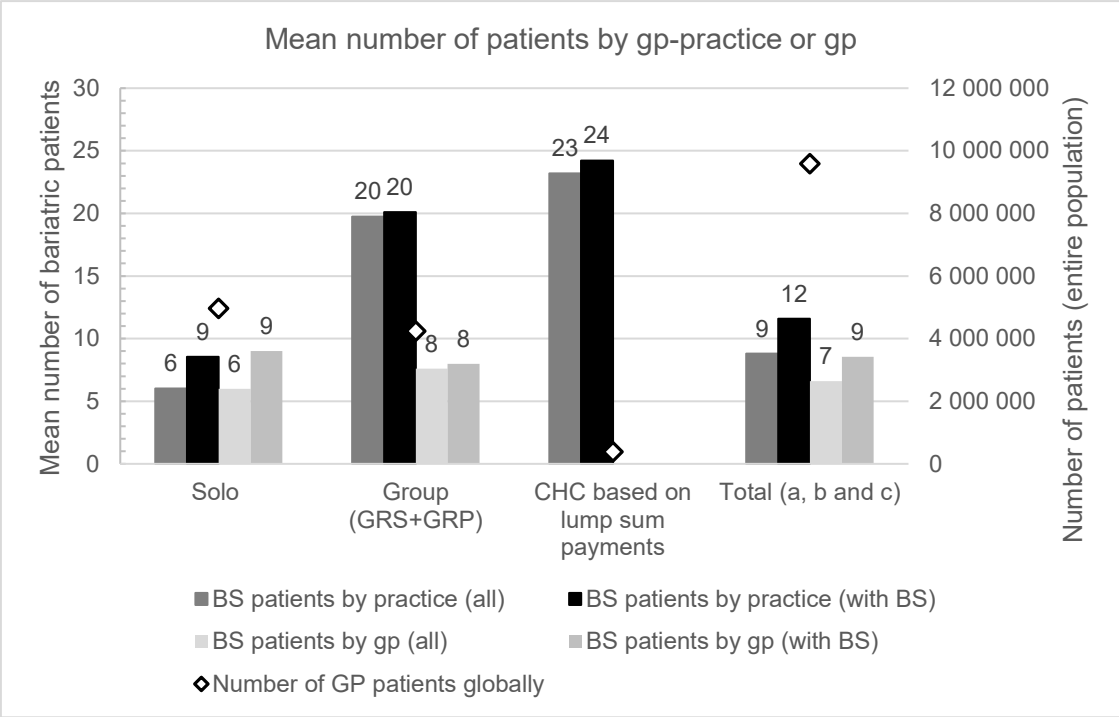
	Province	Total number of BS patients solo	Total number of BS patients group	Total number of BS patients CHC's	Average number of BS patients per solo practice	Average number of BS patients per group practice	Average number of BS patients per CHC
BXL	-	4 020	1 359	1 310	4	16	19
FL	Antwerp	5 090	7 791	257	6	22	23
	Limburg	1 793	4 179	119	5	20	20
	East-Flanders	4 828	4 316	366	5	16	26
	Flemish Brabant	3 210	3 128	88	4	14	15
	West Flanders	3 791	5 172	.	6	20	.
WAL	Hainaut	10 472	3 352	548	9	30	32
	Liège	7 663	2 560	987	8	25	28
	Luxemburg	1 349	622	57	6	21	29
	Namur	3 413	1 743	97	7	23	24
	Walloon Brabant	1 848	765	44	4	17	15
	OTHER	17	32	.	NC	NC	NC
ALL	ALL	47 494	35 019	3 874	6	20	24

Legend. REMARK: NC=Not calculated; BXL=Brussels, FL=Flanders, WAL=Wallonia.

Number of patients by GP

- The average number of patients per GP is highest in the Community Health Centres, followed by the group practices and the solo practices. A distinction is made between the analysis with all practices versus the analysis with only those with at least one bariatric patient. As expected the average number of BS-patients is highest when only practices with at least one BS-patient are considered.
- When we consider all practices, also those with zero bariatric patients, the average number of patients by GP is highest in the group practices (8), followed by the solo practices (6).
- This is probably because within the solo practices there was no minimal activity threshold taken, so a considerable amount of GP's has no BS patient at all (2 329 out of 7 889 or almost 30%). When a minimal threshold of 200 contacts (entire patient population) per year is considered for solo practices, this corresponds to 1 191 out of 6 662 practices or almost 17.9% without a BS-patients. Further explanation about the methodology and figures is given in appendix to chapter 2.
- When we only consider the practices with at least one bariatric patient the average number of patients by GP is highest in the solo practices, followed by the group practices.
- The reason why solo practices become first is because this threshold effectively choses solo-GP's with a minimum amount of (bariatric) patients, while for group practices only the practice as a whole is considered and thus the condition is less limiting. When we consider a minimal activity threshold of 200 contacts per year for solo practices, and group practices are considered active when they have atleast one GP with 200 contacts annually the same sequence remains intact, because again the condition is less limiting for the group practices than it is for the solo practices.

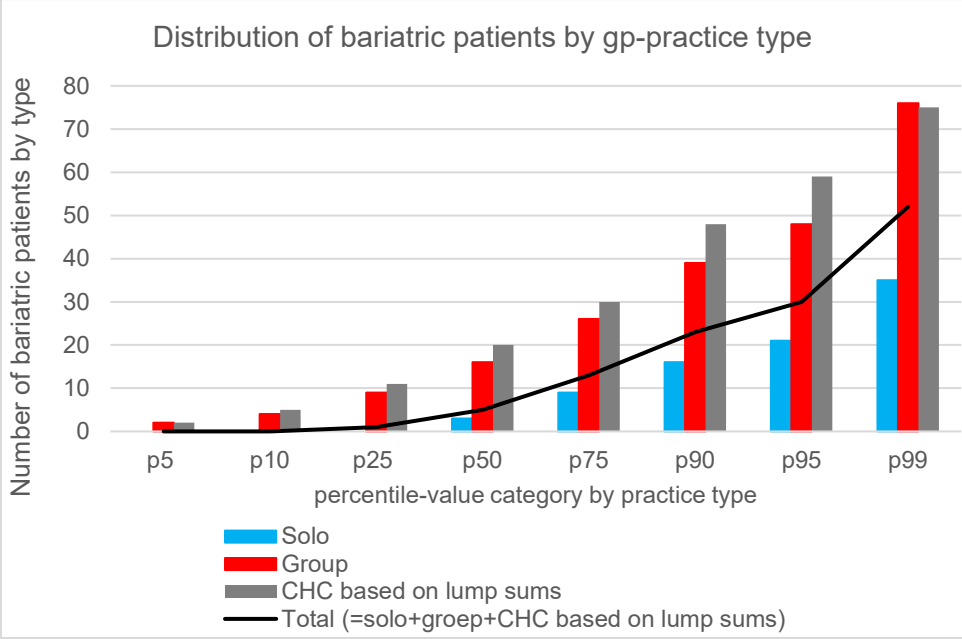
Figure 9 – Distribution of average number of bariatric patients by GP practice or GP per GP- practice type (solo, group, CHC), for all bariatric patients with a surgery in the period 2007-2016, alive and insured in 2016 and attributed to a GP practice



Legend: BS=bariatric surgery; Solo=solo-practices; Group: group practices on one (GRS) or multiple (GRP) locations. CHC=community health centres; (all=all GP's without a threshold for minimal activity; with BS= only GP's with at least one bariatric surgery patient).; number of GP patients globally (entire patient population).

Furthermore an analysis can be made on how patients are distributed within the various practice types, based on Figure 10, where all practices are considered.

Figure 10 – Distribution of all bariatric patients in Belgium(*) according to GP-practice type (solo, group, CHC) and the categorical percentile-value of the number of bariatric patients of each GP practice.



The total of all shares of patients in all the combinations of GP-practice types and p-value (perecntiles) categories amounts to 100% of the bariatric patients.

- Amongst **solo practices** 50% of GP's (3 944) have an attribution 3 or less bariatric patients during one year. These solo GP-practices with a low bariatric surgery caseload have 2 708 bariatric surgery patients under their care. About 14 290 bariatric surgery patients are being cared for in solo GP-practices with a caseload between 3 (P50) and 9 (P75). 25% of GP's (1 975) see 9 patients or more (33 529 bariatric surgery patients). Of this latter group 5% of GPs (294) see 21 bariatric patients or more (a total of 11 900 bariatric surgery patients).

- Amongst **group practices,** 50% of practices (887) have an attribution of 16 or less bariatric patients during one year. These practices with a low bariatric surgery caseload have 6 991 bariatric surgery patients under their care. About 9 345 bariatric surgery patients are being cared for in practices with a caseload between 16 (P50) and 26 (P75). 25% of practices (444) see 26 patients or more (18 683 bariatric surgery patients). Of this latter group 5% of practices (89) see 48 bariatric patients or more (a total of 5 982 bariatric surgery patients).

- Amongst the **Community Healthcare Centres**(CHC's) for patients attributed based on lump sums, 50% of practices (84) have an attribution of 20 or less bariatric patients during one year. These practices with a low bariatric surgery caseload have 635 bariatric surgery patients under their care. About 1 020 bariatric surgery patients are being cared for in practices with a caseload between 20 (P50) and 30 (P75). 25% of practices (42) see 30 patients or more (1 991 bariatric surgery patients). Of this latter group 5% of practices (8) see 59 bariatric patients or more (a total of 662 bariatric surgery patients).

2.3.5 *Pregnancy after bariatric surgery*

Being pregnant after BS may impose some risks on the mother and the foetus such as malnutrition, deficiency of certain nutrients, internal hernia and small for gestational age (SGA) infants.[33] Therefore ideally these women are followed by multidisciplinary teams with experience in the management of pregnancies after BS [34]. Consensus based recommendations point out that it is best to wait with conception untill stable weight is achieved [35].This depends on the individual but is roughly attained after 1 year [36].

In this section we describe the women with a first bariatric surgery (sleeve, gastric bypass, gastric banding) in the period 2009-2011 to be able to have a sufficiently large post-op period of atleast 5 years. The delivery nomenclature considered all types of delivery including neonatal deaths but not miscarriages (see appendix to chapter 2).

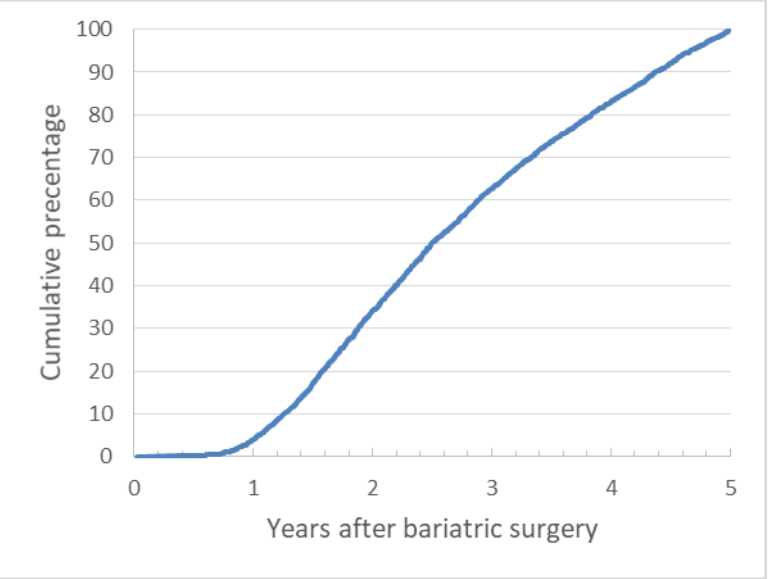
Percentage of women underging bariatric surgery who give birth

From the 26 226 people with a first bariatric surgery in the period 2009-2011, there were 18 857 women and 12 712 women aged between 18 and 45 years old (fertile aged-women). In the period from 2009 untill 2018 there were 4 314 women who gave birth, of which 4 306 were aged between 18 and 45 years old. So in our cohort 34% of fertile-age women who underwent a bariatric surgery in the period 2009-2011 gave birth atleast once in the period 2009-2018. There were 2 723 fertile aged women who gave birth within 5 years after BS (21,4%)

Percentage of fertile-aged women giving birth 2 and 5 years after bariatric surgery

Of the 12 712 fertile aged-women 931 gave birth within 2 years after the first surgery (7,3%) and 2 086 gave birth between 2 and 5 years after the first surgery (16,4%). The more extreme cases of giving birth within 1 year after the first bariatric surgery happened to 106 women (0,8% of faws), and within the first half year to several women (approx. 0%).

Figure 11 – Survival curve, cumulative percent of fertile women with childbirth within 5 years after the first bariatric surgery in the period 2009-2011 (100% is 2723 women).



From the cumulative percentage of fertile women with childbirth within 5 years one can make several observations:

- Women seem to wait at least one year after BS;
- The first deliveries after BS seem to happen, in most cases, 2 to 5 years after BS

We did a sensitivity analysis for revisional surgery, but this did not change the overall picture.

2.3.6 *Accountability patients*

Patients are not made accountable for their own care

'The freedom of choice and lack of responsabilization of patients was mentioned several times by Belgian stakeholders as one of the main problems during follow up care.(site visits)' Patients are not compliant with follow-up instructions and/or appointments. This has no direct repercussion (e.g. reimbursement) whatsoever (despite increased risk on weight regain, side effects and complications). *What's more, if the responsible surgeon builds in too many restrictions in the care pathway (e.g. obligation to see the dietician pre-surgery, to participate at information sessions) or when the time lag between first consult and surgery is (according to the patient) too long, patients tend to look for surgery in another centre where the prerequisites are more relaxed.(site visits)'*

GP's also indicate that many patients see bariatric surgery as a quick fix.[27] They also complain that the information given in (some of) the specialized centres is too much focused on the legal criteria and that the information about the potential side effects (e.g. dumping) and complications is often too limited.

Loss to follow-up is a large problem, especially after more than 1 year.[32]

2.3.7 *Registries*

Although there is legal obligation to keep a registry, there is no systematic standardized clinical registry for bariatric surgery patients in Belgium. Some centres collected data in the context of international initiatives[37] but there number is limited. What's more, centres stopped their participation because data input was cumbersome and feedback limited. In the context of the BESOMs there is a renewed interest to collect data for a bariatric surgery registry and many centres already engaged to do so.[25]

2.4 Key points

- **Bariatric surgery is, in Belgium, reimbursed since 2007. To be eligible for reimbursement certain criteria have to be met (e.g. BMI ≥40 or BMI ≥35-40 with diabetes, therapy resistant hypertension and sleep apnoea, multidisciplinary consultation, >1 year of diet for weight reduction without effect).**
- **In 2017 about 13 000 (first) bariatric surgery interventions were performed in Belgium. This corresponds with 1.2 interventions per 1 000 insured persons. The utilization rates in Wallonia are higher compared to Flanders and Brussels.**
- **There is a yearly increase of about 7.5%. Yet, the increase in bariatric surgery rates is much slower than just after the introduction of the reimbursement.**
- **Gastric bypass is the most commonly performed procedure, especially in Flanders. The use of LAGB is decreasing and is only used in 1.3% of the cases. One surgeon accounts for half of the LAGB procedures.**
- **A conservative estimate based on data of the years 2007-2017 results in 106 679 beneficiaries that have already undergone bariatric surgery. This corresponds with about 1% of the Belgian population. The geographical variation is considerable: 45 municipalities have1.5% or more of the population that received**

bariatric surgery while there are 14 municipalities with less than 0.5% of the population being operated.

- Bariatric surgery is performed in almost all acute hospitals (n=100) with a caseload that varies from 3 to 832 interventions per year (average over three years). More than half of the interventions are performed in 21 hospitals with a caseload of at least 200 interventions per year. Also the type of surgery varies across hospitals: some hospitals perform mainly sleeve gastrectomy while other perform mainly gastric bypass surgery.
- There are 301 surgeons that performed at least one bariatric surgery between 2014-2016 of which 131 have a rounded average of 25 or more per year (93% of all bariatric surgery interventions is undertaken by this group of surgeons). Only 44 hospitals have at least 2 surgeons with an average yearly volume of 25 or more.
- Although the multidisciplinary intake pre-surgery is regulated by law, the intensity of this process differs. GP's regret that they are not (sufficiently) involved in the decision about bariatric surgery.
- Follow-up care is organised differently (e.g. type of healthcare professionals; interventions: blood tests, group education, etc. ; frequency) across hospitals. Although no data about follow-up are available many centres acknowledge that (especially >1 year post-surgery) there is a high loss of follow-up.
- The collaboration between primary care and hospitals is limited and it is unclear at what moment in the care pathway the focus of follow-up has to shift from the baritric centre towards primary care.
- The caseload of patients that underwent bariatric surgery is limited but growing in the GP practices. The number of patients who have undergone bariatric surgery between 2007-2016 that can be assigned to a GP practice in 2016 is 91 674. Of all bariatric patients on average 55% visit solo practices, 40% group practices, and 5% CHC's. This is more or less similar to the overall patient population (51% visits solo practices, 44% group practices, and 4% CHC's).
- This results in an average caseload per practice of 6 patients in solo-practices (9 if only solo-practices with at least 1 bariatric patient are counted; 7 in solo-practices with at least 200 billed consultations); 20 in group practices and 23 in community health centres.
- GP's acknowledge that they have insufficient knowledge about important elements elated to bariatric surgery (e.g. effectiveness, side effects, guidelines regarding follow-up). They focus on the screening for nutritional and metabolic problems via blood tests. Initiatives for practice guidance of GP practices emerge.
- Patients have freedom of choice concerning the bariatric surgery provider and the care they receive post-surgery. Healthcare professionals indicate that this lack of responsabilization is one of the reasons why patients are not compliant with follow-up care.
- There is no standardized clinical registry in Belgium with a systematic collection of data of bariatric surgery patients. Yet, there is a renewed interest of several centres to collect data in the context of a registry.

3 A QUALITATIVE ANALYSIS OF PATIENTS AND HEALTHCARE PROFESSIONALS VIEWS

This chapter includes two parts. In a first part we will discuss patients' views on the care received as well as on the perceived met and unmet needs. In a second part we will discuss the views of healthcare professionals on the organisation and payment of the care for patients that undergo bariatric surgery.

3.1 Patient views: best-practices and unmet needs

Bariatric surgery is today considered as being the most effective long-term therapy for the management of patients with severe obesity, and its use is recommended by the relevant guidelines regarding the management of obesity in adults.[38] Despite favourable clinical outcomes at the short term, concerns exist regarding the long-term effects (e.g. nutrient deficiencies, weight regain, psychological problems, re-interventions) of these procedures and about the required follow-up. International guidelines exist about the follow-up of patients post-surgery. Yet, these guidelines are largely consensus rather than evidence based and their implementation in practice is variable.(see Chapter 4)

3.1.1 Objective

In this part of the report we aim to identify best-practices and unmet needs in the care process based on qualitative research. Qualitative research helps to understand patients' experiences during the pre-surgery phase as well as living with the outcomes of a treatment. It informs us especially about the complexity and depth of the lived experience (e.g. psychosocial changes associated with surgery and weight change). As such it complements quantitative research that traditionally focuses on the clinical outcomes of bariatric surgery.

3.1.2 Methods: interviews with Belgian patients

In qualitative research samples consist of people who are likely to provide the most relevant information in function of the research questions. Hence no random, but purposive sampling approaches are common.

Recruitment patients

Patients were recruited via an open call for participation. The KCE published a press release and posted the call via its website and social media (Twitter, Facebook). Patients were asked to contact the research team (by phone or via the website) if they were interested to participate. Patients were asked to fill in some questions (i.e. date of surgery, type of surgery, centre where surgery was performed; age; gender; contact details) in order to be able to draw a balanced sample.

Patients undergoing bariatric surgery are a relative heterogeneous group. The minimum selection criteria for inclusion were:

- Adult patients undergoing bariatric surgery (exclusion of laparascopic gastric band which is no longer 'recommended'; exclusion of Scopinaro, duodenal switch and biliopancreatic diversion)
- Being 6 to 48 months post-surgery. This period was chosen to balance exposure to aftercare and recall bias. After a couple of interviews it seemed suitable to recruit a couple of patients with a longer period post-surgery since some of the problems only appear after a substantial time period.
- Surgery performed in one of the Belgian acute hospitals.

In addition to these minimal criteria we used a matrix to specify the targeted recruitment criteria more in detail (e.g. gender; representation of patients treated in different centres with various yearly caseloads; language; age).

Data collection process

The research team contacted patients to organize interviews. All face-to-face interviews were conducted in the period between October and December 2018.

The in-depth interviews lasted between 1 and 2 hours and the location was chosen by the interviewee. All interviews were audio-recorded and transcribed verbatim. Before starting the interviews the objective was explained, confidentiality of the discussion was assured and permission to audio-record the discussion was requested. The full informed consent (see Appendix to Chapter 3) was explained and signed by interviewee and interviewer.

Interview guide

An interview guide (see Appendix to Chapter 3) was developed for the in-depth interviews and is available upon request. The general themes addressed were problems, bottlenecks and strengths in the period before (focus on the pre-bariatric surgery pathway) and after the hospitalization for surgery and in the organization of aftercare services. The interview guides for patients were tested during 4 test interviews (2 Dutch; 2 French). Based on the test interviews the interview guides were only slightly adapted. The data collected during the test interviews are also included in the analysis.

Analysis

The transcripts of the in-depth interviews have been coded in QSR Nvivo 11. A basic node structure was created by one researcher, by doing the open coding of the Dutch transcripts. The initial node structure has also been discussed with and validated by the other team members. In a next step the researcher did the axial coding, hence generated overarching themes and relationships between nodes. The interviews with the French-speaking patients were coded making use of this structure. The structure was further developed as the coding process evolved. The final step of selective coding, which means linking concepts together, was part of the reflection necessary to write the synthesis chapter, where all ends meet.

The results are supported by the original text fragments (in Dutch/French), but often paraphrased in the text to allow English readers to understand the text without understanding the quotes.

Ethical approval

Ethical approval was obtained from the ethical committee of the University Hospital of Gent (No. B670201837054).

Disclaimer. The following results (sections 3.1.4 to 3.1.7) are based on statements of interviewees. The quotation marks, and the synthetic headings and text fragments reflect interviewees' perceptions, not verified facts.

3.1.3 Description of the patient sample

We received a response of 159 Dutch-speaking (from 31 different hospitals) and 96 French-speaking (from 26 different hospitals) patients of which 10 and 3 did not meet the inclusion criteria, respectively.

Characteristics of patients

The total sample included 45 patients (23 Dutch-speaking and 22 French-speaking) operated in 31 different hospitals. The majority of patients is female (n=35). The average age of interviewed patients was 43 years (average age females: 42; males 45.5).

In total 36 patients (22 Dutch-speaking and 14 French-speaking) underwent RYGB and 9 (1 Dutch-speaking and 8 French-speaking) underwent SG. The period post-surgery varied between 6 months and 7 years. The majority of patients (n=27) was between 24 and 48 months post-surgery. There were 5 patients in the group between 6 and 12 months post-surgery, and 6 patients in the group between 12 and 24 months post-surgery. A total of 7 patients were operated more than 2 years ago.

The pre-surgery (and post-surgery) BMI was on average 43 (post-surgery BMI: 28) among females and 44.4 (post-surgery BMI: 27.6) among males. Although many patients report to have suffered side-effects or complications most patients in the sample were satisfied about their decision to undergo surgery (see also results section).

Saturation

Although the number of interviews was fixed at 46 prior to recruitment, during data analysis, the researchers felt that at a certain point saturation was reached. This is the point at which no new information was emerging. As such it was decided to not recruit a 46th participant when the audio-files of one interview with a French-speaking patient got damaged. The realized sample also deviates from what we initially planned, which is not uncommon in qualitative research. At a certain moment we decided to also include patient operated beyond 48 months ago to have some contrasting views. Indeed, during interviews patients made clear that some of the encountered problems only started after two to three years. They recommended to interview patients that were operated already several years ago.

3.1.4 Patients' decision for surgery

The process of patients towards the decision for bariatric surgery varies but some trends can be inferred from the interviews.

A long history of (failed) weight loss attempts or other food/eating related problems

Obesity is a chronic condition, in many cases already present during childhood, and most patients have a long history of failed diets and weight loss attempts. Often, they are not the only obese in their social network (e.g. partner, sibling, friends). The obesity (and stigmatization) as well as the past weight loss failures have a negative impact on their self-image and confidence. They sometimes feel ashamed about their condition. Surgery is usually seen as a last resort.

« Eh bien moi, j'avais fait de nombreux régimes qui n'avaient pas fonctionné, donc, chaque fois, j'étais désespéré parce que je voyais la ligne très, très loin, à l'époque, je devais perdre et tout ça, donc, chaque fois, j'étais découragée et chaque fois, je commençais, je perdais un petit peu et puis, après, je baissais les bras et je reprenais tout aussi vite ce que j'avais perdu. Moi, j'étais vraiment démoralisée. À un moment donné, je ne m'aimais plus du tout comme j'étais. »

"Ik ben altijd al zwaar geweest, al van [lacht] de eerste kleuterklas. Dus van zo goed als altijd. Ik heb zo veel Weight Watchers en zo, zo die dingen gedaan. En er altijd wel mee bezig geweest, maar ja, maar dat is niet echt altijd een geweldig succes geweest. …. En dan, nu dat op eigen kracht vermageren dat was niet meer zo gezond. Dat was met overgeven en zo."

J'ai un souvenir très traumatisant d'une personne qui nous gardait en tant qu'enfant qui m'a dit : « Mais un jour tu vas exploser. » Moi, maintenant, à l'âge que j'ai, j'y pense toujours, ça me traumatise toujours, on prend du recul, mais voilà. Et puis, à l'âge adulte, ça va, ça va vient et puis, j'ai eu des problèmes de dépression"

« C'était mon dernier recours en fait. Et finalement, ben ça s'est confirmé parce que le chirurgien … il m'a dit que c'était vraiment mon dernier recours pour pouvoir maigrir. »

Bariatric surgery to become more healthy and normal but losing weight prevails

In most cases patients state that losing weight is the prime objective. Participants state that they made the decision to undergo bariatric surgery in the hope to become healthy but also 'more normal'. Indeed, patients want: less physical problems (e.g. short of breath, [deterioration of] co-morbidities such as diabetes, hypertension) and a healthy body (e.g. to become pregnant);

"J'avais très difficile de respirer, j'étais vraiment mal quand je montais les escaliers, j'avais mal aux jambes tous les jours, mal au dos. J'ai une double hernie donc le poids fait en sorte que ça fasse encore plus mal. »

"Ik was dan ook, bij mijn derde knie was ik dan ook gestopt met mijn restaurant en ze hebben dat hier moeten plooien onder volledige verdoving. En op een gegeven moment woog ik 105 en had ik ook slaapapneu, hoge bloeddruk."

Patients also want a better self-image; take up regular activities of daily living (e.g. household tasks, playing with children); look more normal and blend in like a normal person (e.g. fit in regular chairs, wear normal sized clothing); be a good example for their children; improve their working opportunities; find a normal eating pattern and relationship with food.

"Ik ben tot de beslissing gekomen puur door het feit dat je nergens geen kleren meer vindt. …. Het ziet er gewoon allemaal niet uit. Ook het feit met de twee kindjes, dat wordt ook heel moeilijk. Je bent voor het minste ben je moe. Tegen dat je de trap op bent, ben je doodop, sta je nat van het zweet. En dan gewoon beseffen van het kan niet meer zo, zo gaat dat niet meer verder. En dan, dan is de keuze rap gemaakt natuurlijk. »

"Ik werk als huishoudhulp. En op bepaalde momenten kon ik mijn werk niet meer doen zoals dat moest zijn. "

Patients find it easy to find their way to a bariatric surgeon

Patients inform themselves via very diverse sources but most of them mention that they choose their surgeon based on experiences from friends and family or consult the nearby hospital with which they are familiar.

« C'est ici tout prêt et puis c'est une clinique qui a bonne réputation et où j'avais l'habitude d'aller aux urgences. »

Others search the internet and obtain their information via the social media. It is clear that the choice of provider is colored by personal experiences and coincidence (e.g. reputation on social media, a good and easy to find website, surgeon is a prominent person in the lay press when bariatric surgery is discussed) rather than on transparent and systematically collected information about quality.

« Du marketing, je dirais. Je suis tombée sur le site internet de la clinique du poids idéal. Et je n'en ai pas vu d'autres. Donc je ne savais même pas qu'à XXX donc près de chez moi, ce genre d'opération était possible aussi. Donc non, je n'ai pas hésité avec un autre hôpital, mes recherches sur internet me conduisaient toujours là. »

Limited influence from general practitioners or other healthcare professionals outside the bariatric centers

Some people follow the advice of specialists or their general practitioner with whom they have a long-lasting relationship and who is aware from the failed weight loss efforts in the past and the persistent nature of the obesity and the related co-morbidities.

« Mon médecin traitant me connaît depuis pas mal d'années, donc, il a vu la galère que j'ai eue pour pas mal de régimes et autres et savait que chaque fois que j'ai essayé, chaque fois… c'était le désespoir et moi, je ne m'aimais plus du tout comme ça, donc, lui, comprenait ce que je ressentais et m'a franchement appuyée dans ma démarche. »

In rare cases GP's inform the patients that the approach and quality (e.g. multidisciplinary follow-up present or absent) depends on the hospital.

« J'ai vraiment fait confiance à mon médecin traitant ….elle m'a dit : « Faites attention, c'est pas la même qualité, les mêmes compétences partout. Je sais où je vous envoie. » Maintenant, je n'ai pas cherché ailleurs, donc je la crois sur parole. »

However, in some cases, the general practitioner gives a negative advice regarding bariatric surgery and tries to discourage the patient (but without success). Reasons for this negative advice are linked to a bad experience with another patient or to the individual risk of surgery given the very low health status of the patient.

"… Maar die [mijn huisarts] hekelt een gastric bypass… Ze heeft een sterfgeval gehad. Ze heeft iemand die vorig jaar euthanasie aangevraagd heeft -die was patiënt van haar, die had ook een gastric bypass, die kon ook niks meer, had geen maag meer enzo- ze vertelt dat allemaal aan mij, want mensen worden heel sociaal met mij, dat vind ik dan ook niet fijn. Dus zij vertelde van 'ja, ik zie veel te veel bij die gastric bypass. …"

« Elle était contre ? » Participant « Oui, parce qu'avec mes accidents de voiture très graves, et mon anévrisme, mon AVC, tout ça... j'ai quand même subi beaucoup de problèmes. Et elle disait que je n'étais pas en bonne santé pour faire une telle opération. »

The tipping point for patients who hesitate to undergo surgery is often a good experience from someone they know (friend, family, contact on social media, other patients if they are healthcare professionals themselves).

"Et puis, j'en ai un peu parlé autour de moi. « Ah oui, moi j'ai une collègue qui s'est fait opérer ». « Ah oui, moi j'ai l'amie d'une amie » et tout. Donc, finalement, j'ai essayé de contacter toutes ces personnes et tout en leur faisant part de mon expérience"

"Dat gaat mij wel lukken maar mijn broer heeft ook zo'n ingreep laten doen en ik heb ook het effect bij hem gezien en op een bepaald moment ben ik écht tot besef geweest van, ik kan dit niet alleen oplossen."

Decision not always supported by friends and relatives

The support of friends and family is important. While patients often receive a lot of support for their decision (e.g. by the partner, friends, colleagues) this is not always the case. Some patients indicate that their partners were insufficiently involved in the decision. It also happens that partners are against surgery because of the risks but also because they (in particular males) are afraid that their partner will become more attractive and get more attention from other males after surgery.

Some family members and friends see bariatric surgery as the "easy way out" as they are unaware that continued adjustments to diet and lifestyle are required to be healthy and to achieve a sustainable weight loss on the long-run. Moreover, patients report that they were blamed by others to be reimbursed by public money for something that is their own fault and can be remediated "if they just try hard enough". Some patients anticipate on these negative reactions and the advice not to undergo surgery, by not informing their relatives (or only very few) about their decision.

Alors, au tout début, la première personne c'est mon mari et sa première réaction a été : « C'est la facilité. » Alors là, c'est juste ce qu'il ne fallait pas dire : « T'as rien compris. » … Quand mon mari a vu que je commençais les démarches, que j'étais super motivée et que j'étais bien prise en charge, que c'était une super équipe, que tout était, voilà… il m'a suivi. Je lui ai expliqué plein de choses, il m'a suivi déjà dans tout mon parcours avant avec mes dépressions, etc.

« Pour ma maman, elle disait : « mais enfin, il va quand même falloir arrêter que la société arrête de payer pour des gens qui bouffent quoi ». … « c'est quand même pas normal que ces opérations soient remboursées, alors que c'est des gens qui se laissent aller ».

« Hij wou dat niet. Hij wou dat absoluut niet. Hij vond mij mooi zoals ik was en dat ging slecht zijn. Hij had daar een heel slecht beeld van en ja, het is ook wel zo gevaren he... "

« Mais je parlais pas trop avec les gens, parce que je l'avais déjà dans ma tête. Le fait de parler à n'importe qui, ça n'allait pas changer. J'avais déjà pris ma décision…., je ne voulais pas avoir d'avis en disant : « Est-ce que tu es sûre de ce que tu fais ? Est-ce que… ci ? Je trouve que c'est pas la bonne solution. C'est pour ça que je n'en ai pas parlé. »

3.1.5 Preparation during the pre-surgery phase

The pre-surgery pathway is, to a certain degree, regulated by law (e.g. multidisciplinary advice from surgeon, physician in internal medicine and psychologist/psychiatrist required). Yet, from the description in the section below it seems that there is still much room for improvement on several aspects such as standardization of care, disciplines involved, type of information provided, etc.

3.1.5.1 Organization of the pre-operative pathway

Advantage of the compulsory nature of the pre-operative pathway: a minimal care set up is guaranteed which is sometimes in sharp contrast with the post-operative pathway

The compulsory nature of the multidisciplinary approach has the advantage that the pre-surgery pathway is more structured within each bariatric centre than the post-surgery pathway. Patients experience a lot of differences in the care received pre- and post-surgery. They indicate that the compulsory nature of the pre-surgery phase obliges them to comply. This is in sharp contrast with the complete freedom to adhere (or not) to the follow-up care. Some patients indicate that their only contact with a dietician or psychologist was during the pre-surgery phase. During the post-surgery phase no follow-up appointments, besides consultations with the surgeon, were made.

« Ouais. C'est le cas pour le premier rendez-vous. Parce que la coordinatrice elle s'occupe de ce qui est préop. Mais après l'opération on est obligé à rien en fait ! »

"Ik heb daar ook een heleboel vooronderzoeken moeten doen. … Dus dat is eigenlijk heel rap gegaan maar de nazorg vond ik een beetje in die tijd toch euh aan de mindere kant."

"De diëtiste heb ik niet meer gezien sinds onze gesprekken daar voor de operatie. Dus over het algemeen weet ik ook niet van doe ik goed, doe ik het niet goed. Hm"

Difference between centres

Despite the compulsory aspects of some parts in the pre-surgery pathway, it seems that care varies between centres. In some centres for instance patients have to follow a strict pre-surgery diet while this is not the case elsewhere. Also the opportunities to access physiotherapy, exercise classes, information sessions, medical consultations (e.g. anesthesiologist, endocrinologist versus only the surgeon or the resident in training), lab test and physical examinations differ.

This can maybe explain the different appreciation by patients of the pre-operative pathway.

3.1.5.2 Usefulness of the pre-operative pathway

Some patients are very positive about how they are prepared for surgery and the post-surgery phase but others are not.

Opportunity to access care and to find problems otherwise not detected

Patients appreciate that the pre-operative preparation offers an opportunity to find problems otherwise not detected**.** Through a thorough medical evaluation, medical problems (e.g. underlying causes or consequences of obesity) are found. Since psychological screening is compulsory it is, for instance, possible that the initial psychological screening lowers the threshold for patients to access psychological care during the post-surgery pathway. This is important to deal with underlying psychological problems (for which they otherwise would not seek help).

« Godzijdank voor de endocrinoloog, want hij heeft met het probleem gekomen waardoor ik dus eigenlijk zo vlug verzwaarde en eigenlijk met alles niet naar beneden ging. Ik zit met de ziekte van Hashimoto."

« Non, déjà au départ je m'étais dit... déjà au départ la psychologue, ... j'avais déjà discuté que je voudrais bien une fois aller voir une psychologue et tout ça. Mais encore une fois, c'est le fait de faire le premier pas en fait. Et là, c'était dans les rendez-vous de la coordinatrice, il n'y avait pas le choix. Donc je me suis dit : ben en fait, l'un dans l'autre. Et là, la preuve au bout de 8 mois j'y vais toujours. Pas forcément par rapport à l'opération, mais je trouve que c'est important et que ça fait du bien en fait. »

Useful preparation for the intervention and the post-surgery phase…

Few patients state that they were well-prepared for the surgery and the life after surgery. They mention, for instance, that the dietician or the psychologists took sufficient time to explain in-depth what the patient can expect.

« Oui, parce que je suis allée au psychologue, il m'a bien dit de bien avoir dans ma tête que c'était une opération, que ce n'était pas comme ça. Que c'était une opération, et que ce n'était pas garanti à 100 %, que je pourrais regrossir après. Tout dépendait de mon alimentation et comment je mangeais. Il a dit ça, il m'a bien expliqué aussi, le psychologue, il m'a dit : « Il faut bien vous ancrer dans la tête que ce n'est pas une opération miracle. C'est une opération pour maigrir, mais ce n'est pas miracle. » Si on force, on agrandit l'estomac, ou qu'on… chose… on a des risques de regrossir quoi. »

Not going in-depth enough to be helpful

Several patients do not see the need for the pre-surgery pathway. Some of them already made the decision to undergo surgery and were very determined.

A group of patients indicate that the care received during the pre-surgery pathway is too superficial to be helpful. The focus of the pre-surgery pathway is on 'having a disease' or excluding severe contra-indications while some patients indicate that the real challenge is to learn to live with the consequences of their disease and the surgery. They have to make drastic and lifelong changes to their eating pattern, their level of physical activity, deal with their eating disorder, etc. For these changes they feel that they are insufficiently prepared.

Euh, misschien dat die wel aan tafel zitten samen en afvinken van moeten we iets zeggen over die patiënt en is dat oké dat dat toelaat. Euh, zoiets vermoed ik wel maar ik heb niet de indruk gehad nadien dat er overleg was. Dat heb ik niet gehad. En zeker niet wanneer dat het dan een heel eind verder is, maar ge zijt nog met al die moeilijkheden aan 't worstelen dan is dat precies, het is voorbij. Trekt uw plan een beetje. 't Is nu, het is zo op het niet ziekzijn gericht. Maar gezondheid is veel meer dan dat. En deze operatie heeft geen nut als het alleen maar over echt niet ziek zijn gaan moet wel iets meer zijn dan dat want je moet het ook kunnen volhouden en je moet ook je leven kunnen aanpassen en in dan al die omstandigheden, euh heb je wel iets meer nodig dan alleen maar…

Some patients experience the consultation with the psychologist as a mere obligation rather than a real support. Some state that the psychologist only check boxes to exclude severe underlying psychological problems. It doesn't help them to deal with their problems or to initiate behavioral changes. Patients also indicate that they can 'trick this process' and know what they have to tell the psychologist to be eligible for surgery.

« ... moi je l'ai vu qu'une fois, bon oui, une fois. Elle a donné son feu vert pour l'opération… »

« Pff, c'était plus un peu par formalité. …je dirais qu'elle était plus là pour juger, savoir si j'étais prête ou pas. Elle a vu que j'étais prête, que j'étais décidée. Donc, voilà, c'était bon. Je l'ai revue quelques fois après. Pff, ça m'a pas spécialement, heu…, aidée… »

« … Dat bezoek aan de diëtiste vooraf, dat had den voor mij zelfs niet bijgehoefd en, laat ons zeggen aan het bezoek aan de psychologe daar heb ik ook geen wereldschokkende ervaringen aan overgehouden, dus. Allé, voor mij waren die medische onderzoeken voldoende geweest. Nu weet ik dat die psychologe dan ook, een…, zich een beeld moet vormen of ge het niet om verkeerde redenen doet. Oké, maar ikzelf heb daar heel weinig aan gehad. Allé, die heeft…da heeft mij niet geholpen noch tegengehouden in mijn beslissingsproces, laat het mij zo zeggen"

« Donc, quelles vont être les questions du psy ? Comment est-ce qu'il faut se comporter chez le psy ? Vous trouvez ça en deux clics sur Google. »

Streamlined care process: everything on one day is not always appreciated

Some hospitals organize all the pre-surgery tests and consultations (e.g. internal medicine, surgeon, psychologist, dietician) on one day. While this is often appreciated by patients (e.g. convenient for people with busy lives), it has the risk to be superficial since several patients indicated that one consultation with a dietician or a psychologist is insufficient to be properly assessed, informed and motivated to change their lifestyle.

« … j'ai eu une journée complète, heu…, organisée par la coordinatrice avec tous mes examens le même jour. Et ce jour-là, oui, j'ai eu, heu…, évidemment une prise de sang complète. J'ai eu un, une échographie abdominale. J'ai eu un ECG avec rendez-vous chez le cardiologue, avec un médecin, plus un médecin plus généraliste, pneumologue. Enfin, voilà un petit peu, pour voir, heu…, plus généraliste. J'ai vu une diététicienne, enfin un nutritionniste. … Une psychologue. Tout ça le même jour. Ou…. Moi, je trouvais ça très bien, heu…, parce que vraiment tous les, tous les examens ont été pris heure par heure. …"

3.1.5.3 Duration of the pre-surgery pathway

When the decision is made … most patients want to be operated as quickly as possible

Patients that are very convinced about the surgery want to be operated as quickly as possible. Before the operation they often see the compulsory pre-surgery pathway as a burden and a waste of time.

4 mois. … C'était trop long ! C'était trop long ! Moi, quand elle m'a parlé de la Sleeve, je voulais me faire opérer le lendemain moi.

While afterwards they admit that taking time to make an informed decision is important

Retrospectively, however, many patients admit that it is necessary to have enough time pre-surgery to think about this life changing operation and to be sufficiently prepared to deal with the necessary lifestyle adaptations and (potential) underlying problems (e.g. eating disorders).

Dat was kort. Nu bekeken vind ik dat ook kort. Maar toen vond ik dat oh ja, tof, ik had zoiets van ja we gaan ervoor. Maar ik had totaal niet ingeschat hoe je daar mentaal ook moet in kunnen groeien hoe dat je moet allé. En als mensen tegen mij zeggen, hier ze houdt u papieren en dat staat er op voilà alsjeblieft en als je dit volgt dan ben je binnen het jaar 50 kilo afgevallen. Dan denk ik oh ja fijn [lacht].

Pour moi, dans les moments, six mois c'était assez long, mais je vois aujourd'hui que ça a passé vite. Oui. Quand j'étais dedans, je voulais vraiment me faire opérer le plus vite possible, mais c'était bien. Comme ça, j'avais du temps pour réfléchir, pour voir si c'était ça que je voulais ou non. C'était bien.

J'avais posé la question au chirurgien la première fois que je l'avais vu et il m'avait dit entre 4 et 6 mois, donc on est dans le bon. Extérieurement comme ça, ça peut sembler long, mais il faut ce moment-là, psychologiquement pour s'y préparer. De toute façon, il y a tous ces rendez-vous, on peut peut-être les avoir plus rapidement, mais il faut le temps. Psychologiquement, c'est vraiment nécessaire, c'est une décision tellement importante et qui va changer… on dit que c'est une nouvelle vie, c'est un peu ça, donc je pense que c'est vraiment nécessaire. J'en ai vu certains partir même en Tunisie pour avoir vraiment une date très proche, etc., mais n'ont pas tout ce suivi, cette prise en charge, ils ne vont pas faire le trajet tout le temps et ils n'ont pas ce temps. Moi, en tout cas, ça m'aurait pas convenu.

However a too long delay (around 1 year) can demotivate some patients.

Ik denk dat dat toch een klein jaar is. Omdat je dan alle sessies, normaal vier tot vijf sessies bij de psycholoog doen. En dan bloedonderzoeken, en tegen dat je bij elke arts een afspraak krijgt, want dat lukt niet om dat allemaal op één week te doen. Euh gaat daar wel wat tijd over. En ik denk dat dat net geen jaar was bij mij dat dat geduurd heeft. Tegen … I: Dat is toch wel behoorlijk lang? … Ik vond dat te lang. Omdat je dan ook beseft van daarna ga ik … in het begin, zeker in het begin, niet meer kunnen eten en dan begin je ervan te profiteren. En dan ja dan komt er zeker nog een pak bij op het einde. Dat euh, en dat is eigenlijk niet gezond, nee.

3.1.5.4 Inclusion criteria

Inclusion criteria are not always met

While the multidisciplinary process is compulsory it is mostly the surgeon who makes the final decision. Some surgeons overrule the negative advice of, for instance, the psychologist or dietician. Although this can be an informed decision at the time of surgery (e.g. surgeon agrees with the patient that they operate if they receive additional psychological support care), some patients regret this afterwards.

"Ik heb nog altijd geen goede eetgewoonte en dat had de diëtiste ook voorspeld. dat had zij ook gezegd. Want zij had mij eigenlijk geen compleet groen licht gegeven voor de gastric bypass. En ik heb dan samengezeten met mijn chirurg en wij hebben samen afgesproken wat ik zou zeggen voor uiteindelijke mijne "go" te krijgen. Want ik heb nog steeds mijn eetgewoontes, da, ik zeg dat altijd. Ik ben ni geopereerd in mijn hoofd, ik ben geopereerd in mijn maag. En da's 't probleem. Ik heb nog steeds een suiker- en een vetverslaving. Nog altijd. Die klik krijg ik nog altijd ni gemaakt. alé terugkijkend vind ik dat een fout van de chirurg …. "

Some patients also stated that there is a conflict of interest as the psychologists need to give approval (exclude psychological contra-indications) while they are employed by the bariatric care centre. Some patients indicate that they received the advice to gain weight to fit within the legal criteria for reimbursement.

« Il faut te mettre à manger du chocolat et des frites matin, midi, soir pendant 6 mois pour y arriver. Il faudrait complètement être fou d'aller faire ça. Ah non, il [le médecin] lui a dit d'aller... Vous faites ce que vous voulez, vous arrivez avec le poids. Donc elle est allée avec des plombs, une ceinture de plomb. »

Patients also mention that [via contacts on social media] it is clear that some surgeons operate outside the legal criteria. These surgeons work in private clinics and charge patients the full amount.

"Ik vind wel nog één ding, en dat zien we ook op Facebook dat sommige specialisten gaan opereren met een BMI van 32. En dat vind ik wel erg, die mensen laten opereren. Zelfs onder de 35 zelfs ook nog, die geen bijkomende dingen, veel te laag gaan opereren. …. een privékliniek, zodat ie wel gewoon gastric bypassen kan uitvoeren. Ja, da's een gevaar voor de maatschappij. Want ik zie in mijn gastric bypass-groep, daar zijn meisjes euh, die zijn 1, 65 m en die wegen iets van 86 kilo. Die krijgen een gastric bypass van hem, hè, op zondagmiddag voor 5000 euro."

3.1.5.5 Choice of type of surgery

Process for choosing the type of surgery varies

Some patients rely entirely on the surgeons' advice to decide about type of surgery while others solely rely on non-professional advice. Once, they decided to undergo bariatric surgery they look for a surgeon to perform the operation of their preferred choice. Other patients also search the internet and inform themselves via patients who already have undergone surgery. This information is often complemented with information received from the healthcare professionals before a final decision is taken. It also depends on who they contact. Some surgeons want to tailor the surgery on the patients' needs (e.g. type of eating disorder, patients' choice, medical problems). They inform the patients about the pro's and con's of each type of operation and explain why a particular type of operation is more suited for them than

another. Other surgeons tend to follow the patient's wishes much more easily which entails the risk to opt for a surgery type that is less adequate.

Non, je suis allé beaucoup sur internet, … Et j'ai pu, par de visu, vraiment constater que le mieux, c'est la Sleeve par le Dr xx et rien d'autre. Intervieweuse Et là, l'équipe médicale vous a suivi sur votre décision de faire la Sleeve ? Ou bien on a quand même hésité ? Interviewé Oui, direct. Non, non direct la Sleeve.

« Oui, alors la décision n'a pas du tout été prise lors de ce premier rendez-vous. Il a donné un avis, en fait, le choix se fait surtout en fonction de notre manière de manger, donc la sleeve on préconise souvent aux gros mangeurs et le bypass pour les grignoteurs et dans ce que je lui ai expliqué, je lui ai dit : « Je suis quand même une grosse mangeuse, mais je grignote aussi, mais uniquement le soir. » Je ne grignote pas toute la journée, mais le soir parce que je compense, que c'est un moment plus calme. Donc, il m'a dit : « Dans ce cas-là, peut-être plutôt un bypass. » Ça m'a un petit peu remué parce que dans ma tête, je m'étais préparée déjà à la sleeve, donc là, je me dis : « Ouh ! » Donc là, j'étais perdue et il a dit que ce serait en fonction des examens et de la rencontre des différents intervenants, que ça allait être décidé et qu'on verrait ensemble. Il m'a bien dit que ce ne serait jamais imposé, que c'était vraiment d'un commun accord entre les professionnels et moi. »

3.1.5.6 Information needs

The technique of the operation and the potential risks are well explained by the surgeon …

In general, the surgical technique and the risks of the operation are well explained by the surgeon. Patients report that surgeon takes sufficient time to explain the operation and to give the patient the opportunity to ask questions.

Heu comment se passait l'opération oui. Il m'a heu et petits dessins et heu moi plein de questions, j'avais heu je suis curieuse, j'aime bien de savoir ce qu'on me fait et heu et pourquoi ça plutôt que ça donc heu et j'avais mes questions et heu il n'a pas su répondre à tout la première fois (rires) parce qu'il y a des gens qui attendaient, mais bon heu, on a repris un rendez-vous et il a répondu à toutes les questions ça oui, sans problème.

Yet ... information about living with the consequences of bariatric surgery is often limited

Patients indicate that the information they received (or as they captured it) is often too optimistic (e.g. about the amount and durability of the weight loss, the complications). They also state that not enough attention is paid to the behavioral changes and other implications (e.g. lifelong use of vitamin supplements) that are needed (and how they can be attained) after surgery. Patients indicate that this is not the core business of the surgeon and therefore implicitly state that there is a need to be guided by other healthcare professionals as well.

Ik weet, de allereerste afspraak, dan was er ook ne stagiair want dan was efkes om den eerste moment, euh was die er ni bij, was die nog met iemand anders in gesprek. En, toen hij stagiair heeft tegen mij gezegd: "Na de operatie ga je nooit meer honger hebben". En dat is dus ni waar, hè. Nee, inderdaad, de eerste één à twee jaar had ik dat zo ni maar nu hebbe 'k ik eigenlijk bijna constant honger.

Le médecin a cette spécialité de la chirurgie, mais il ne donne pas suffisamment, il ne donne pas d'informations de la vie après... Enfin...

Mais ce n'est pas son job. Il est là pour vous expliquer techniquement ce qu'il va faire, la différence entre un bypass, une sleeve, la parcours préopératoire, tout ça. Il est là pour vous expliquer ça. Mais, il n'est pas là pour vous expliquer la vie de bypassé. D'ailleurs il n'en sait rien, il n'est pas bypassé.

Ik heb dat toen niet euh ik heb dat toen niet geregistreerd dat er een mogelijkheid was dat ik terug zou bijkomen. Dus ik kan niet zeggen ik heb daarna … dus ik heb jammer genoeg daarna pas die Faceboekgroep euh ontdekt en daar las ik dat wel. Maar ja, ik vond, ja die eerste gesprekken dan had je precies nog meer moeten zeggen van ok ja dat gaan de

gevolgen zijn eigenlijk voor de rest van uw leven. En ja, de rest van uw leven die vitaminepillen pakken enzo,…

Several patients indicate that the **information about potential side effects** of bariatric surgery is insufficient. Although patients also admit that they are not very receptive for information about side-effects and complications during the pre-surgery phase (because they want the operation to obtain weight loss at any cost) they state that more efforts are needed to inform and prepare patients on these negative consequences. This is not only the task of the surgeon. Problems that seem to be insufficiently elaborated during the pre-surgery phase are psychological change, alcohol use (both the increased sensitivity as well as the risk on substance abuse) and loose hanging skin (impact and cost of reconstructive surgery). Yet also other problems such as the impact of bariatric surgery on a relationship and sexual activities were mentioned.

Den dokter, de chirurg, die zei altijd ja ja en geen alcohol, en geen alcohol, en geen alcohol. Net zoals die zei, en gene suiker en veel ijzer en, euh. Maar het blijkt dat dus, euh, en dat heb ik pas achteraf gehoord, die informatie die had ik wel van hem verwacht, die heb ik niet van hem gekregen, dat een bepaald percentage van mensen die die operatie hebben ondergaan achteraf alcoholproblemen krijgt. Ik dacht dat dat gewoon was geen alcohol, net zoals gene suiker want anders ga je terug verdikken, hè, want alcohol is per slot van rekening omgezette suiker maar, euh, nee nee, dat was, dat was het psychologisch, allé, nee, dat 's geen psychologisch ook niet. dat was het effect van een alcoholprobleem krijgen en ik merkte inderdaad dat, vroeger dronk ik al eens een pintje in 't weekend en dan als ge bezoek had in de week al eens een glaasje wijn ofzo. maar dat 'r zo'n periode was dat ik elke avond één, twee…

I. Est-ce que vous vous attendiez à avoir autant de peaux qui pendent ? P. Non, je ne m'y attendais pas. En fait, c'est vraiment... C'est la chose qu'on n'avait pas parlé en fait.

P. Après l'opération elle [la psychologue de l'équipe] m'a dit : ah oui, mais Madame, c'est connu. Après l'opération il y a un couple sur trois qui saute. Et je m'étais dit : « mais pourquoi vous m'avez pas dit ça avant ? » Il y a des choses que j'aurais dû préparer avant, par rapport à ça. Des questionnements que j'aurais dû avoir par rapport à ça, qui n'ont pas été. Parce que, je n'y ai même pas pensé à ce moment-là, mais on me l'a dit après. Et des choses comme ça, je trouve que c'est important de le dire avant.

3.1.5.7 Role of general practitioner's varies: from active referral to not involved at all

Some patients (but limited in number) have a lot of confidence in their general practitioner (GP) and are inclined to follow their advice when they are referred to surgeon. After all their GPs generally have a good view on the medical, psychological and socio-economic context of the patient, the history of the obesity and the past weight loss attempts.

… mon médecin traitant, à qui j'ai été parler, à qui j'ai parlé, je lui ai dit que je prenais ça comme décision et que je lui ai dit surtout que je ne voulais pas que les autres soient au courant, parce qu'il soigne mes sœurs aussi, etc. Donc, je ne voulais pas, il m'a dit que de toute façon, ça restait entre lui et moi et je me suis vraiment sentie soutenue par lui.

Other patients refer themselves directly to specialised care in a bariatric centre. They bypass the GP for several reasons. Some patients, for instance, go straight to the bariatric centre because they already decided themselves that they did find reliable information (e.g. via friends, social media, internet as described in the section 3.1.4) and do not want to lose time or to hear negative advice from a GP. Others indicate that they do not have a GP (or often switch from GP), that they think the GP only has limited knowledge and expertise about bariatric surgery and metabolic diseases, etc.

…nu mijn nieuwe huisarts, had ik hem wel een paar keer over gesproken en die zei ook van ja "probeer toch een keer te letten op uw calorieën" …Maar ik denk dat ze zelf moeilijk de link leggen van iemand door te verwijzen naar een endocrinoloog omdat, vind ik zelf, persoonlijk er nog zo weinig geweten is over schildklierproblemen dat te maken hebben met uw

gewicht, dat te maken hebben allé met uw gemoedstoestand, allé dus ja dat is begrijpbaar ook... Dus dan ga ik er ook van uit dat een huisarts dat ook niet echt 100% weet van ok dat kan daarmee te maken hebben, en dat de link daarmee ligt, spijtig, maar ja, dus voor dat met het voortraject ben ik [het zieknhuis] toch wel enorm dankbaar. Ik ben dan uiteindelijk bij de chirurg terecht gekomen. ……

Some patients indicate that the GP is informed by the bariatric surgery centre. This information is, in general, unidirectional and it seems to be very rare that the GP is actively involved in the decision process or in the pre-operative preparation.

I « Et le médecin traitant, est-ce qu'il intervient dans ce processus ? » P : « Ben quand j'ai été le voir, je lui ai expliqué. Je lui ai dit, puis il reçoit. Il a reçu, je vais dire le rapport du médecin, de tout ce qu'il s'était passé, mais sans plus. »

« Oui, donc il a assisté. Parce qu'ils ont eu des réunions entre médecins, etc. Par rapport à mon dossier. Il a assisté à ces réunions-là, il a eu un retour à chaque fois de chaque médecin. Et il en a encore. Quand il voit que quelque chose ne fonctionne pas, d'office il envoie les informations vers le chirurgien, et le chirurgien fait de même… »

3.1.5.8 Attitudes from healthcare professionals

Few patients mention negative reactions of healthcare professionals (e.g. nurses, GP's, obesity clinic staff, healthcare professionals working in a bariatric surgery team). Some patients feel that they are not respected or even humiliated and blamed by healthcare professionals during the conservative treatment or pre-surgery phase. This can have an impact on their confidence in healthcare professionals as well as on the follow-up adherence.

« Donc, voilà, je suis allée là où j'ai été super mal accueillie, super mal. Le médecin qui m'a reçue, d'une nonchalance avec les deux pieds sur la table a dit : « Pourquoi venez ? » Eh bien voilà, pouf, il m'a tendu sa brochure. Et puis, il m'a dit : « Vous réfléchirez. Vous reviendrez quand vous aurez décidé ». Je suis ressortie de là. J'ai dit : non. C'est pas possible. »

« Ze gaven mij daar ne repliek van ' ja en ge zult nooit niet afvallen als ge elke dag chocomelkskes ligt te drinken en ik dacht in mijn eigen dat is al een commentaar want ik dronk geen chocomelk. Dan... en ik was zo, ja ik voelde me zo vernederd dat 'k ik niet meer ben teruggegaan. »

3.1.5.9 Clues (as mentioned by the patients) for potential improvement of the pre-operative pathway

Group meetings with peers for information

Group meetings with peers prior to the operation could help to make an informed decision. Patients state that the experiences reported by patients are clearer and less abstract than information given by a physician. It is seen as a useful complement on (but not a substation of) the information received by the healthcare professionals.

Several hospitals organize information sessions in group during the pre-surgery phase. Yet, there are also hospitals that organize meetings post-surgery. Patients appreciate it to get in contact with their peers and assess these meetings as 'less theoretical' and more 'practical' than the information given by the healthcare professionals alone. It is also informative for partners and family to attend such meetings and these sessions give a more realistic view on expectations and post-surgery life compared to what is found on the social media. Yet, some state that these sessions are not helpful and discouraging when they are not 'professionally organized' or focus solely on 'weight loss'. On the other hand the patient population is so heterogeneous that it is not always helpful and difficult to organize. In any case it seems a pre-requisite that the healthcare professionals ensure that the information sessions are professionally organized and that the information given is balanced and correct.

"Donc là oui, mais c'est vrai que j'ai envie de dire, et sans prétention aucune, mais je comprends la difficulté d'organiser tel type de réunions pour essayer de réunir des gens j'ai envie de dire, de tous milieux. Et ce n'est pas du tout péjoratif. Mais d'âges différents, de sexes différents, etc. qui ont été opérés, bon des méthodes différentes, etc. Et je le redis, de milieux différents. Parce que, du temps du docteur Bellachef il y avait comme ça des groupes de rencontres. Et alors j'y étais allée une fois, je m'étais dit : ben oui et c'est vrai que j'étais revenu, j'avais aussi pris peur. Je m'étais dit : « mais enfin, est-ce que le but est de devenir mannequin ? » Enfin, je trouve que les gens qui allaient à ce type de réunions là, à ce moment-là hein, c'était plus « je retrouve une deuxième jeunesse, je vais sortir à draguer, etc. ».

"Goh, ik ben wel naar XX , ken je dat misschien, bijeenkomst geweest. … Maar dat was zo amateuristisch voor mij, allé de eerste keer dat ik die leerde kennen, …. Ah ja, die, hoe moet ik het zeggen, lotgenoten, patiëntengroep zal ik maar zeggen. … Ik ben ook een keer naar een bijeenkomst geweest, één of twee keer, maar dat werd dan zo amateuristisch geleid dat ik dacht van ja hier kom ik niet meer. Soms heb je zin in lotgenoten-contact, maar soms ook niet."

Social media with interventions of healthcare professionals

Patients undergoing bariatric surgery are often very active on social media. They use social media to find information about healthcare providers or benefits and risks of surgical techniques. Discussion fora are a mean for patients to get information but they recognize that level of medical knowledge is often low. Some patients suggest to set up a forum supervised by a healthcare professional.

« Je veux dire, enfin ça ne doit pas être en mode freestyle sur Facebook. Il faut vraiment quelqu'un qui cadre. […] Et quand les gens n'ont pas la connaissance comme sur ces groupes Facebook, ben elles se commentent les unes les autres, et je pense que quelqu'un qui est dans la réflexion n'a peut-être au bout du compte pas sa réponse. Tandis que si c'est modéré par un professionnel, alors là, à ce moment-là... »

Tools with information

Written information is considered as useful by some patients, mainly if they can easily add news or advices.

« …une farde rouge avec plein de renseignements, tout le parcours qui explique. Je ne sais plus ce qu'l y avait dedans, je crois qu'il y avait déjà l'importance du sport, arrêtez le tabac, plein d'informations, tous les documents pour qu'on s'y retrouve vraiment bien dans nos rendez-vous médicaux, enfin voilà. C'est quelque chose qui… on m'a expliqué que c'était une farde importante qui devait me suivre à chaque rendez-vous. Je trouve que c'est quelque chose de rassurant. Moi, j'aime bien en tout cas les choses bien structurées, claires et j'ai besoin d'être… »

To practice in group helps to change behavior

In some centres other initiatives (e.g. joint sport activities,) are set up to motivate patients to sport together. This helps some patients to start to sport.

Nurse involvement

Nurses are quoted as a trustworthy person for the bariatric care pathway, less medical, able to perform technical acts but also to listen to the patient if he/she has no good contact with the psychologist. Involvement of a nurse in the bariatric team appears to support some patients.

« Moi, je m'attendrais à voir plus une infirmière aussi, qui est peut-être moins médicalisée que le médecin. Je ne sais pas comment vous dire. C'est peut-être aussi parce que je suis infirmière…

En pré-opératoire que ça soit un peu une personne de confiance, que ce soit elle qui réalise votre prise de sang préop, des choses comme ça. Et qui vous voit aussi en post-op, pour faire les prises de sang, qui soit là, pour… je ne sais pas, peut-être en relation de confiance, vous savez, vous n'avez pas envie d'en parler à la psychologue, les psys, moi, je n'ai pas toujours envie de leur parler. »

3.1.6 Post-operative follow-up

As indicated in other chapters a lot of problems, side-effects and complications can occur after surgery. Also when reading the interviews a long list of problems (e.g. divorce), psychological issues (e.g. negative self-image, depression), substance abuse, symptoms (e.g. fatigue, hair loss), side-effects (e.g. abdominal pain, vomiting) and short- and long-term complications (e.g. internal herniation, Barret, anemia), re-hospitalization are reported. The severity of the reported problems differ but it contributes again to the viewpoint that long-term multidisciplinary follow-up is required.

3.1.6.1 Organization of the post-operative pathway

Highly variable between centres

A transversal reading of the interviews makes it clear that the multidisciplinary follow-up is highly variable between centres in terms of healthcare professionals involved, duration and frequency, intensity of support, content, effort to increase follow-up adherence, communication with GP's, etc. This is also observed by patients that have been followed up by different centres or who know friends or relatives that are operated in another centre.

"Maar dat vind ik dus ook heel vreemd dat dat zo anders is, elke arts daar zijn mening, allé dat is normaal dat iedereen een mening heeft maar dat er toch zo weinig eenvormigheid is. Dat vind, ik neem aan dat als je met een gebroken arm naar het spoed gaat dat je, dat die spoeddiensten wel ongeveer op dezelfde manier zult geholpen worden. Maar hier is dat allé ja….Heel veel verschil. En ook naar de ene zegt dan spuitjes van vitamine, de andere zegt oraal allé zo heel heel ja. Zoals bij mijn vriendin in het ziekenhuis in XX, die wordt veel beter opgevolgd, die wordt, als die gaat dan krijgt die direct een afspraak voor de volgende keer, bij de arts, bij de diëtiste. Die wordt veel beter opgevolgd. »

« Franchement, heu…, j'ai…(silence) enfin à partir du moment où j'ai été bien suivi, je trouve que j'ai été super bien suivie là où j'étais. C'est vrai que j'ai vraiment eu une mauvaise expérience et là, j'en ai une bonne. C'était le jour et la nuit. Donc, c'est vrai qu'il y a une disparité énorme, je pense, d'un hôpital à l'autre et d'un médecin à l'autre et que les expériences sont complètement différentes selon le médecin qui vous opère et l'équipe qui gère. Je pense que c'est très important. »

Well organized multidisciplinary team with standardized appointments and follow-up

Several patients report being followed-up by a multidisciplinary team. They report that standardized follow-up appointments are made with the medical team (surgeon sometimes complemented with endocrinologist), the dietician and the psychologist. While the latter is mostly only scheduled in case of problems (e.g. detected during the pre-surgery phase) or upon request some hospitals give a first post-surgery appointment for all patients to assess if further psychological support is required. In addition, some centres offer guided patient group sessions and exercise therapy. Patients also signal that a standardized care pathway needs to be able to accommodate 'outliers'. Patients that are followed-up by a multidisciplinary team appreciate it and report positive effects on their lifestyle changes and self-esteem.

"Ja, die hebben een heel team: de chirurg, een coördinator, Dr. XX, die twee kinesisten die er ook nog bijzijn. Alé, ja, ik vind dat geweldig. Ge wordt goed opgevolgd. En ik vind, ik heb geen, als ik in de tijd als ik nog vragen had naar [de diëtist] toe, kon ik altijd een mail sturen omdat ik niet direct kon. Dan antwoordde zij altijd en dat wat meer. Als ik dan bij haar ging voor iets te vragen, stuurde ik nog een mail en kreeg ik daar antwoord op."

The type and level of standardization of follow-up appointments varies between centres

The follow-up of patients in the bariatric centres is organised in different ways: some centres routinely schedule several appointments in advance; others provide appointments on demand; some appear not to offer clear organized follow-up care at all.

a. Routinely appointments complemented with possibility of ad-hoc (remote) contact for smaller problems

Follow-up consultations can be organized as part of a standardized care pathway and appointments can be scheduled or be available upon demand. While some patients indicate that they prefer on demand, for others the standardized appoints work best. Nevertheless it is important that patients can deviate from this standardized pathway. Several patients indicate that it is very important that they can contact someone in-between appointments with small questions. A telephonic contact or even an e-mail (which is handled on short term) can work very re-assuring. Other patients indicate that this is missing in the current care offer.

Some patients miss also the fact that they have to take the initiative outside routine appointments and that during the follow-up care they are not actively approached by the healthcare professionals (on the HCP initiative) to ask if everything goes well.

"Ja, of dat je ergens een punt hebt waar dat je naartoe kunt bellen als je vragen hebt. Een soort helpdesk of zo, ik weet het niet maar dat ze zeggen als er iets is belt, hier aan de receptie zit die u, die op die afdeling zit iemand die je altijd te woord kan staan, kan helpen met problemen die je eventueel hebt. Dat zou misschien wel een oplossing zijn. Nu niet dat je 24 op 24 een call centrum moet hebben om … Dat je toch ergens … Iedereen heeft over tijd, heeft overdag wel tijd om een telefoontje te doen dat je zegt van oh ik heb daar last mee. Als je weet dat je ergens terecht kunt en dat je de vraag kunt stellen.

b. No standardized follow-up but available upon request

In some centres patients are not included automatically in a multidisciplinary follow-up program. They are told that, in case of problems, they can contact the bariatric care centre. This is reported as a barrier (e.g. reluctant to seek help) by some but not by others. On the contrary, the latter group considers this as very convenient and re-assuring. In other centres they are only invited for medical appointments (e.g. surgeon and/or endocrinologist) while consultations with other healthcare professionals are available upon request or in case of problems. The care offer 'free of obligations' is in contrast with the compulsory nature of the pre-surgery pathway. Several patients indicate that this withhold them to seek care and does not stimulate them to change their lifestyle as needed.

« Je sais que je peux les contacter à tout moment pour quelle question que ce soit. Je ne l'ai jamais fait, mais je sais qu'ils sont là. On me l'a déjà dit à l'hôpital : « S'il y a la moindre question, si vous ne vous sentez pas bien, vous nous téléphonez. » Le chirurgien, la diététicienne, je sais qu'ils sont là. C'est vraiment un soutien, on n'est pas là lâché dans le vide comme ça. Ça, pour moi, c'est important, même si je ne l'ai jamais fait, je n'ai jamais osé ».

c. Apart from medical consultations follow-up care is absent in some centres

In some centres there is no organized follow-up care while some of these centres say they have it during the pre-surgery phase. Patients have the feeling that they have to find out everything themselves. This is not stimulating them to undertake the necessary lifestyle changes. Some patients also indicate that, in case of problems, they do not know where to go. This is the reason why some symptoms and/or underlying problems remain undetected and (unnecessary long) not treated (e.g. abdominal pain, gal stones).

"Ik heb dat nooit gehad. Nee. Van de operatie zelf ben ik tevreden, van de nazorg iets minder.. Dat is een beetje aan mijn lot overgelaten op dat gebied, en ja dan moet je zelf dingen beginnen uitzoeken hé." ..

.. « avant de t'opérer, on va avoir des discussions d'équipe, on ne te laissera jamais toute seule, il y aura tout un suivi. On sera tous là autour de toi ». Finalement une fois que j'ai été opérée, il n'y a plus personne.

Timing and frequency of consultations

In some centres appointments with psychologists and dieticians are made for every patient. Nevertheless some patients question if these appointments are made on the most adequate moment. After all, it is known that the first couple of months after surgery for most patients everything goes

well (e.g. substantial weight loss). Nevertheless after this so-called 'honeymoon period' problems might occur (e.g. weight regain, negative self-image, etc.). It is therefore important that specialized care is available at critical moments. These can be related to the bariatric surgery or to other life events (e.g. divorce, loss of a relative, problems at work).

The frequency of follow-up is highly variable. During the first year this differs from 1 time per year to 4 times per year. After the first year the frequency generally decreases. Patients indicate that 1 time per year is insufficient to detect problems. Besides the frequency also the duration of follow-up varies between hospitals. While some hospitals do not organize standardized follow-up at all, others do this for 1 or 2 years. Longer than two years is rare. Patients indicate that the time when they are discharged from specialized follow-up care is crucial. After all some experience it as a big step to contact the specialized caregivers after this period (e.g. because they feel they failed, are ashamed, etc).

… diëtiste niet meer, psycholoog wel. Ik heb euh - efkes denken qua tijdspanne- ik geloof ja een jaar na de operatie, een dik jaar, heb ik er eventjes door gezeten, een emotionele put: euhm, mijn vriendje kwijtgeraakt, mijn beste vriendin kwijtgeraakt en ik zat er echt onderdoor en omdat, euhm, ik weinig contact had met een psycholoog, heb ik gewoon een afspraak gemaakt.

Holistic and empathic approach by every single team member is important

Patients appreciate but also expect that every team member is respectful, takes sufficient time to listen to them in an empathic way. This creates trust and will help to motivate them as well as to report problems, non-compliance, etc.

Le fait d'avoir été la semaine passée chez ce médecin qui m'a jugé, qui m'a accueilli, qui m'a dit : je vais vous aider, je suis là avec vous sur votre chemin...Elle m'a redit ce que je savais déjà, qu'il faut arrêter de boire, oui, oui. Mais, il y a quand même eu quelque chose de l'ordre de la motivation qui a ouvert chez moi une perspective de dire : allez, c'est possible quoi… C'est pas seulement... ça n'a pas duré 5 minutes ce rendez-vous, je crois que je suis quand même restée une petite heure, où il y avait quelqu'un qui croyait avec moi qu'une reprise en main est possible. On ne va pas y aller par 4 chemins, il n'y a pas 10 000 moyens de se reprendre en main. Mais elle m'a insufflé une espèce de motivation qui fait que j'ai envie de la revoir, et j'ai envie d'avoir quelqu'un sur mon chemin qui va me dire : « Où est-ce que vous en êtes ? » ça ne va pas, qu'est-ce qu'on va faire ? Voilà.

Mijn specialist die luistert echt goed. Die geeft, die helpt u waar die kan en dat vind ik chapeau. Want er zijn er veel die maar zeggen, van, ja kom, he, foert, he, weet je wel. Maar zij doet dat niet. Zij helpt u waar zij kan. Ik vind dat ja, een vree. Ja, dat zou ik toch willen dat mensen toch eerst naar de specialist gaan of naar hun huisdokter desnoods maar dat ze pas daarna…

Sending a report about a consultation to a colleague is not the same as multidisciplinary collaboration

Patients are aware (and applaud) that physicians send letters to each other to report their colleague about a consultation but they consider this as insufficient.

Ja, wat had er beter kunnen zijn ? Ik denk de voorbereiding van… rond vitaminetekorten, rond het geheel samen, euh dat is door heel het traject wat ik echt ervaren heb die een tekort was, de samenhang tussen de verschillende disciplines en de verschillende dokters, euh de koppeling met mijn huisarts – euh, een brief heen en weer is niet genoeg- huisartsen zijn op dit moment, denk ik, niet altijd voldoende op de hoogte euh en er is mij gezegd geweest van 'je kan vitaminetekorten hebben en dat komt zeer regelmatig wel voor, hé, maar we zullen je multivitaminen geven, daarmee zal het opgelost zijn maar zo simpel is het allemaal niet geweest [R lacht]… 't Is toch wel complexer geweest allemaal, ja.

3.1.6.2 *Financial aspects*

Some patients mention that the financial impact of the surgery is limited because they met the INAMI/RIZIV criteria for reimbursement and hospital costs are covered by the Sickness funds and sometimes by an additional private insurance (or other organisations as CPAS). There is heterogeneity between patients according to the employment status and social situation. There is also difference in reimbursement depending the consulted healthcare professionals (e.g. ambulatory or in hospital). In some cases, the delay for the reimbursement can be a problem.

Dans le post opératoire, financièrement, c'est pas toujours évident. Moi ça a été la même chose aussi. Ça a mis six mois pour que je touche ma mutuelle parce qu'il y avait eu des soucis ou ils disaient que c'était OK, il manquait des documents, etc. Donc ça aussi ça a été un petit peu compliqué.

Even when they have to pay something (e.g. new clothes, vitamins,..), some patients are so satisfied with their decision and weight loss that they do not consider this aspect as a problem. At least in the short term. They balance the cost of the surgery and the follow-up care with the food budget (that decreases after the intervention) and the fact that some of the chronical treatment scan be stopped. Some patients mention how they cope with the cost post-surgery and how they manage to decrease the costs (e.g. buying clothes).

Euh, het is duur hé [de follow-up]. Ik bedoel euh, zeker en vast. Maar ja eten is ook duur [lacht]. Ik bedoel euh. En soms heb ik ook zo periodes gehad van eigenlijk geef ik nu zoveel geld uit eigenlijk aan eten want ja, dat is ook nachtwinkels, allé dat is allemaal veel duurder. Veel meer eten kost ook meer gaan sowieso. Uw kleren die altijd veranderen. Allé eigenlijk heb je heel veel kosten gewoon door al een eetstoornis te hebben en dan, soms dacht ik ook van ja ik heb al zoveel kosten gewoon om doordat ik een eetstoornis heb en dan moet ik nog een keer bijbetalen om nog een keer er iets proberen tegen doen hé, dat is zo precies een dubbele kost zo. Maar dat zou mij nu niet tegenhouden.

Non. Enfin, moi, je me suis dit : de toute façon, je vais prendre un médicament quand même pour le diabète, le truc, le machin et tout. Finalement, je remplacerai celui que je prends plus par un autre que je prends quoi. Voilà. Heu…, non, si j'avais une aide, pff, non, je trouve pas. Je trouve que la personne qui se fait opérer, parce qu'elle a des problèmes cardiaques, après ses médicaments, est-ce qu'ils sont remboursés ? Peut-être. J'sais pas. Non. C'est sûr que si c'est remboursé, tant mieux, mais heu…, je trouve pas spécialement injuste que ce soit pas remboursé. Je connaissais le risque avant. Je savais. Voilà.

Daarom, het handige is: ik zit hier aan de Nederlandse grens. Dus ik kan al die supplementen kan ik gewoon bij de Kruidvat of de Etos halen. Dus dat scheelt wel. Da's 5 euro voor een potje,

After some time however, financial resources needed for dietician or psychologist consultations, vitamin supplementation, sports can be an obstacle to continue with an appropriate follow-up (see Reasons for non-adherence and Clues for potential improvement). Some patients, working as self-employed workers, mentioned also the loss of financial revenue when they have to attend consultations after surgery. Moreover, certain complications require specific management that is not reimbursed. Skin problems after weight loss is an example quoted by some patients: if they do not meet the INAMI/RIZIV criteria for abdominoplasty, the aesthetic surgery is not reimbursed. This is a financial obstacle that frustrates many patients. This can lead to bad quality of life, sexual discomfort and even suicidal ideation. Other examples that were given of not reimbursed management of complications are antacid medication and dentist care due to persistent and recurrent vomiting.

Ja. Ja. Want een gastric bypass is een serieus kostenplaatje hé. Als het goed gaat, dan moet ge u eigen alleen zorgen maken over kleren, medicatie, multivitamienen enzovoort enzovoort.

Maar als ge dan nog elke week een diëtiste gaat zien, dan krijg je ook niet volledig alles terugbetaling hé. Dus ge moet het wel...Ge moet het geld hebben, hé. I: Ja. Dus dat is ook nog wel een drempel dan eigenlijk van ... daarna. P: Ja, absoluut want ge krijgt daar niks van terug, denk ik, hé ? I:

Diëtiste niet, denk ik. P: Dus, ja. Da's duur hé. Ja, dus ik kan me wel inbeelden dat dat een trigger is om het niet te doen.

Het probleem is, ik ben alle dagen als vertegenwoordiger de baan op, … ..Het probleem is als ik naar de dokter moet, die werken ook nooit op tijd, dan ben je daar een halve namiddag aan kwijt, maar dan verkoop ik niets en dan draai ik geen omzet en dat is een grote verlieskost. Andere financiële aspecten is natuurlijk dat het euh duur wordt op gebied van kledij.

Mijn armen, mijn borsten, mijn buik, mijn kont, ... zelfs mijn onderbenen hebben veel overschot. Dus, er moet wel serieus aan gesneden en getrokken... .. Persoonlijke lening doen. Zij laat de bovenkant doen, dus armen, buik en borsten, kost 5500 euro. Dat is niet min. ..

3.1.6.3 Medical care

Follow-up by surgeons is appreciated

The focus of consultations by surgeon is, by its nature, on medical issues (e.g. wound healing, vitamin supplements, lab tests). Some patients state that these follow-up appointments reassure them (e.g. confirmation that everything is ok) and are important to detect (potential) complications.

Ben oui, parce que j'ai confiance en lui. Donc quelque part, oui, j'avais besoin d'avoir la certitude que tout allait bien et que... On garde malgré tout cette image de tout ce qu'on a vu à la télé, de tous les risques. Donc, on est relativement attentif aux moindres douleurs, aux moindres... Voilà. Donc c'est quelque chose, oui, j'avais besoin de... Quand lui m'a dit : « voilà, pour moi tout va bien. Maintenant vous êtes lancée, l'amaigrissement se passe bien. » Mais je sais que sa porte est ouverte, je sais que je peux prendre un rendez-vous et retourner le voir en lui disant : il y a ça qui me gêne, ou il y a ça. Mais, voilà.

The time of a consultation is too short to deal with all important aspects

The time of a consultation with some surgeons is too short to discuss problems in-depth. Neither, does the medical consultation allow to evaluate if the approach followed by the patient is adequate. Some patients report that surgeons delegate follow-up appointments to their residents. While this is not the patients' preference it is accepted as long as the resident in training has sufficient expertise in bariatric care and support from the bariatric surgeon.

Patients appreciate surgeons when they feel they provide time to listen and talk to them. Some patients value the follow-up by the non-physicians (e.g. dietician, nurse coordinator) because they have more time available for them to discuss their diet, behavioral changes and problems.

[bij chirurg X] Ja. En goh ja patiënt gaat er binnen en 3 minuten 4 minuten zijn ze terug buiten. Wat kan je nu vertellen op 2-3 minuten. Ik kan heel mijn leven niet vertellen, maar ze moeten toch weten. …

Le chirurgien, je l'ai vu au début tous les 6 mois, pour les un an. Mais bon, avec le dr XX c'est tac-tac-tac quoi. C'est bonjour, au revoir, merci. « Ah vous êtes joli, c'est bien ». C'est vraiment... Avec la diététicienne, j'ai plus de contacts.

Physicians outside the bariatric surgery centre do not recognize the 'red flags'

Some patients report that complications are too late detected when they contact physicians not specialized in bariatric care (GP).

Je suis retournée à la garde, je suis directement retournée à la garde, et là, j'ai été très mal prise en charge par la garde, qui m'a renvoyée à la maison, etc., en disant que voilà et tout… Alors que là déjà… Le lendemain, je retourne, parce que ça ne va toujours pas mieux. Je téléphone à la consultation, qui me disent de venir directement et là, je suis suivie directement par le chirurgien et qui là décide de m'hospitaliser

directement et là, je suis prise en charge, d'une façon compétente, enfin… et lui est très fâché contre la garde.

Compliance to life-long vitamin supplements is not so easy

A recurrent theme in the medical follow-up is the use of vitamin supplements. Patients indicate that the choice of supplements depends on the surgeon or the patient. Not all patients receive sufficient information about the importance of vitamin supplement use and the need of lifelong adherence.

Ik kan dan wel vitaminen bijbetalen, van Fit for me, kost ongeveer 75 euro voor zes maanden. Hoe lang ga ik dat moeten innemen? Dat hebben ze in het ziekenhuis niet gezegd. Ik heb dat zes maanden gepakt, ik ben daar nu drie weken mee gestopt. Ik ga dat niet blijven betalen, ook niet absoluut eigenlijk dan toch.

While most patients report that lab tests are taken (often by the GP) to follow-up the need to adjust vitamin supplements, problems are reported about the adequacy of follow-up. Some patients report that problems occur due to micro-nutritional deficiencies which could have been prevented with a better follow-up.

Om…om…omdat ik die al die vitaminetekorten, euhm, da's niet goed genoeg opgevolgd geweest. Dat heeft veel te lang geduurd. Ik ben…ik ben echt verzwakt geraakt. Ik heb euh, een complicatie had, nog…nog een tweede operatie d'rbij en de terughoudendheid van dokters om u snel qua vitaminen…'t is 't is veel te traag gegaan…

Loose hanging skin and the need for reconstructive surgery

Several patients report to have undergone aesthetic or reconstructive surgery (e.g. breast reconstruction, abdominoplasty) because of loose hanging skin. While the aesthetic element plays a role in their decision it seems that the discomfort (e.g. sweat, skin lesions, smell, back problems because of large breasts) is more important. The decision to perform surgery is mostly postponed until the weight of the patient is stable.

Verleden jaar of over twee jaar, heb ik wel een buikcorrectie laten doen. Waarom? Dat, niet dat ik in bikini wil lopen, ver van hé, maar in de zomer zweette ik en dat vel hing in een plooi.

3.1.6.4 Psychological support

Psychological support is required to change the eating behavior and to deal with psychological problems and a changing self-image

Psychological support is required to change the eating behavior especially in case of an eating disorder. What's more patients value psychological support in case of psychological problems underlying or related to the obesity and bariatric surgery.

Some patients also state that it is important to deal with their new self-image, relational problems, reaction of others and with coaching (e.g. goal setting, realistic expectations). The timing, duration, frequency and intensity of the psychological support depend on the underlying reason and need. The need can, for instance, only appear after a couple of years or be present immediately after surgery. Several patients indicate that it is important that the psychologist has expertise in obesity, eating disorders and bariatric surgery.

Dat is heel psychologisch ook, een grens, terwijl dat die psychologe zegt: Hé, of dat gij nu 70 of 71 weegt, dat weet niemand hé. Maar als gij terug 75 of 80, ja dat is iets anders. Maar ge moogt niet zo u vastpinnen op dat getalleke op uw weegschaal, want dan wordt ge ongelukkig en dan gaat ge alles doen voor dat getalleke, terwijl we dat eigenlijk juist niet willen. We willen dat ge een gezonde levensstijl hebt. …… .. Ja dat helpt wel. dat helpt wel.

Et on va être honnête, nous aussi on a eu une période vraiment difficile où encore une fois, heureusement que j'avais un suivi psy, parce que j'étais complètement perdue. Et c'est ma psy qui m'a aidé à voir clair et à ne pas prendre de décisions que j'allais regretter après forcément. (Hésitation) Et je trouve ça... Je trouve qu'il devrait y avoir... Je ne sais pas, on ne sait pas... Encore une fois on ne sait pas obliger les gens, mais pour moi c'est

vraiment important le suivi psychologique après l'opération parce qu'il y a tout, il y a tout qui... C'est une opération de l'estomac, mais il y a toute votre vie qui est chamboulée en fait.

For some patients, it is not needed that the psychologist has a specific training in bariatric surgery or in obesity. Instead he/she has to be able for in-depth listening. There are also patients that prefer to consult a psychologist with which they are familiar.

Pour moi, il ne faut pas une compétence particulière. Donc je ne cherche pas de la psychoéducation quand je vais voir un psychologue, je ne veux pas qu'il me réexplique le B-A-BA. Je veux quelqu'un qui puisse, je voulais dire le B-A-BA des règles d'hygiène alimentaire quoi. Donc pour moi, le psychologue (alors, quelle que soit son école ou son orientation) doit être surtout à l'écoute de ce qui est en train de se jouer, en deçà ou au-delà juste du comportement alimentaire.

… Donc voilà, peut-être que par moment on parle plus poids, nourriture, mais ça déborde très vite sur d'autres sujets. Et là, le psychologue doit être capable de réceptionner. Mais une formation spécifique à la clinique de l'obésité... ça ne me paraît pas indispensable. Pour autant qu'il a une bonne formation à la psychothérapie.

Available upon request works for some but not for all

Other patients do not see the need for psychological support. They consider it sufficient and re-assuring to know that the possibility exists to contact them in case of a perceived need (e.g. event in their private life, weight regain). In some centres there is a default first appointment with the psychologist post-surgery. Based on the individual needs it is than decided if more regular appointments are required. Yet, for other patients this doesn't work. There is a threshold to consult the psychologist. Therefore, when it is not part of a standard appointment they will not take the initiative to make an appointment. In other centres the psychologist is not part of the multidisciplinary team.

Euhm...diëtiste niet meer, psycholoog wel. ..een jaar na de operatie, een dik jaar, heb ik er eventjes door gezeten, een emotionele put: euhm, mijn vriendje kwijtgeraakt, mijn beste vriendin kwijtgeraakt en ik zat er echt onderdoor en omdat, euhm, ik weinig contact had met een psycholoog, heb ik gewoon een afspraak gemaakt in ziekenhuis XX, … één of twee keer naar een psycholoog geweest in het ziekenhuis waar dat ik ben geopereerd en ja, dat deed gewoon deugd om met een buitenstaander te praten over de problemen dat ik toen had en dat heeft me wel een beetje geholpen, ja. Ook omdat er emotionele dingen gepaard gaan met een gastric bypass, was dat toen wel moeilijk, en vandaar allee dat zij mij het beste kon helpen, dacht ik dan en dat heeft wel geholpen. Dus...

Voilà, parce que ce n'est pas évident de se retrouver. Parce que je veux dire, on a l'impression d'avoir perdu quelqu'un en cours de route. Enfin… I. Et ça, cet accompagnement, il est fait par qui ? Parce que je vous ai entendu dire : « Je n'aime pas les psys », donc, les psys n'ont pas de rôle à jouer là-dedans ? P. Mais si on peut jouer avec les psys, il ne faut pas que ça soit que une consultation psy, vous voyez, que ça soit que des nutritionnistes ou autres, mais c'est quelque chose qui m'a manqué.

3.1.6.5 Dietary- and nutritional advice

The advice of dieticians helps to deal with a new eating pattern when tailored to patients needs and feasible

Most patients have a long history with dieticians (e.g. to deal with their obesity prior to the decision for surgery). The advice to follow a diet is often a sensitive topic because of failed diet attempts in the past. Nevertheless patients acknowledge that the advice of a dietician can be very valuable. They help patients to adapt to a new eating pattern and give them practical tips and tricks (e.g. what to order when dining in a restaurant) tailored to the time post-surgery and the daily life (e.g. adapted to their social life, travel plans, work environment). This requires a specific expertise in bariatric care as well as in coaching and behavioral change. As such the advice should not be restricted to the 'technical diet'. Patients express the need for practical tips, support and coaching to obtain behavioral changes.

Il faut…(silence) je veux dire, chacun son métier. Et diététicienne, enfin, c'est pas la même chose, diététicienne dans un centre de chirurgie bariatrique que diététicienne pour des ados que diététicienne. Enfin, voilà. Voilà. Je pense que ce sont des optiques différentes et, heu…, et, et des pistes différentes parce que quand je vais chez elle et que je lui dis, heu… « Je sais pas quoi boire quand je vais au resto ou je sais pas », des trucs comme ça, c'est elle qui me donne des pistes en me disant : « Mais essaye le cidre parce que, ça, si ils ont… »

Ja, ik weet dat zijn domme dingeskes hé, maar dat is wel een diëtiste dat u dat moet zeggen, van hé pakt een dunner boterhammetje, eet een toast he, toast het, dat dat gaat dus veel gemakkelijker.

Moi, j'étais perdue par rapport aux protéines, et il m'a beaucoup aidé là-dessus. Il m'a installé une application dans mon téléphone qui, j'entre tout ce que je mange, et elle en fait, tout ce que je mange elle le transforme en protéines, en grammes de protéines pures que j'ai mangées par jour. Et comme on a du mal à stabiliser, je continue à perdre, je dois avoir un certain minimum de protéines par jour, et ça me permet de surveiller tous les jours, au fil de la journée, si j'ai mangé assez de protéines, ou si je dois encore en manger en fait. Et tout ça, c'est grâce au diététicien que je l'ai. Parce que si je n'avais pas mon suivi chez mon diététicien, je ne saurais pas surveiller

The lifestyle advice doesn't stop with nutrition, there is also the need that they (or other team members) advice the patients to exercise, sport and how they have to (re-)organize their daily lives.

Le chirurgien m'avait dit : si vous avez l'intention de faire du sport et tout ça, attendre que je vous revoie après un mois d'opération pour être certain qu'il n'y ait pas de soucis et tout ça. Mais j'en avais beaucoup discuté avec le diététicien, et même par rapport à ça en fait. Je reçois des conseils par rapport au sport parce que j'étais un peu perdu sur quoi faire en fait. J'ai jamais... J'ai jamais fait de sport avant parce que je savais pas.

Focused on period immediately post-operative

Several patients mention clear instructions about the first few weeks after surgery. Yet, many state that this was the only information and support that they received while they assess a need for support to integrate lifestyle changes on the long-run. This can be due to shortcomings in the care offer but also because patients chose not to attend follow-up appointments.

Ja, heel gedetailleerd, heel gedetailleerd en dan de eerste keer moest ik na een week terugkomen. Dan na 14 dagen, dan na 6 wek- allé zo. Dat heb ik allemaal opgevolgd. … Maar na 2-3 maanden heb ik gezegd, ik besef wat dat mijn verantwoordelijk is, maar niets niet meer mogen is geen optie voor mij. Ik beloof dat ik naar mijn lichaam luister en euh dat ik het niet zal forceren. Want dat is, dat is natuurlijk als je op het laatste, als ik met 107 kilo woog, dan, nu besef je dat.

Information leaflets are insufficient

Some patients state that there was no access to dietary or nutritional counselling whatsoever. They received an information leaflet with instructions on what they can eat immediately post-operative. But this is assessed as insufficient. Patients experience the need for advice (e.g. practical tips) and support.

Là, il y a un vide. Moi, je trouve. …qu'il manque ça et qu'on se retrouve à la maison, aller chercher notre farde et se dire : « Ah oui, qu'est-ce que je pourrais manger le matin ? Ah oui, ça, est-ce que je peux manger ? »… Une fois que vous êtes plongée dans vos feuilles, vous dites : « Eh oh ! » moi, j'ai lu plusieurs fois pour ne pas me tromper, vous avez la peur de vous tromper et de faire une erreur quelque part. Et de mal faire. Et moi, ma peur, c'était un lâchage de suture, des choses comme ça. C'était vraiment ma peur, c'était le choc septique, et un lâchage de suture. Donc, je ne sais pas combien de fois, j'ai été voir combien de millilitres, je pouvais avoir, combien…

Dietary advice is assessed as insufficient when it is limited to 'technical advice' about the diet

When patients receive 'technical information' about what they can eat and what not they often consider this advice as not helpful because it is not realistic to fit into their daily lives in a sustainable way. In addition it doesn't provide them with the insight why they can eat some ingredients but not others.

… Die begeleiding [diëtististen in bariatrisch centrum] die blijft wel, ik bedoel, je moet jezelf goed informeren ervoor ook vind ik. Dus ja, voor de rest heb ik, dat centrum, die mensen deden veel hoor. Allé ik bedoel, die leggen dan wel uit wat dat je moet eten, wat dat je niet moet eten. … En dat mag je eten en dat mag je niet eten. En er zit er niemand niet van: en wat vind je er nu eigenlijk zelf van. Eh, zeg nu eens als je in een restaurant zit, of je zit thuis, eh wat denk je dan?

Patients with an eating disorder require more than a few consultations to change their behavior

Several patients have an underlying eating disorder. They acknowledge that they will not be able to adhere to the dietary guidelines when the support is restricted to a few consultations only.

.. de diëtiste, ik moet zeggen de diëtiste in ziekenhuis XX ietsje minder. Ik ga ze zeker ook niet afbreken, maar ik ben iemand die verslaafd is aan suiker. Dus die mensen kunnen dat niet helpen hé. Ik zou suiker voor pakken voor voeding. Middeltje om dat af te leren, is er nog niet gevonden of pilletjes die bestaan er ook nog niet. Nu, ik doe mijn best natuurlijk van niet constant suiker te eten hé ja. Maar die nazorg, ja, ik denk dat we misschien wel beter zouden moeten begeleid worden. …

Important that nutritional advice is consistent throughout the multidisciplinary team

Patients mention to have received contradictory advice about the diet and the required nutritional adaptations. This problems relates to lack of consistency, communication (e.g. no exchange of information within the multidisciplinary team) and expertise (e.g. nurses working in the hospital give other advice than the dietician). This also holds for other aspects of care. Patients report contradictory advice (potentially due to lack of guidelines, standardization or expertise) on several domains. An example is the advice about vitamin supplements. The advice about content, frequency and duration of the required of vitamin supplements differ between caregivers.

Mais au niveau des infirmiers, ça manquait un peu d'informations. Ils ont conseillé certaines choses après l'opération … Mais le nutritionniste n'était pas du tout d'accord.

Dat vind ik heel vreemd eigenlijk. Dat er toch tegenstrijdige dingen op staan, maar die zullen die diëtisten wel dezelfde cursus gekregen hebben. Dus de een diëtiste of de andere het is eigenlijk een groot verschil. Maar ik heb een hele goede nu in het ziekenhuis hier en ik ben er content van.

Not all dieticians and healthcare professionals have the necessary expertise

It's not because someone is educated as a dietician that they have the expertise to support and coach bariatric surgery patients (and the underlying eating disorders). Patients report this as a problem both with dieticians working in a hospital where the patient was operated as well as with primary care dieticians. Moreover, some patients do not see a dietician and receive their dietary and nutritional advice from the surgeon or the GP. While this can help them to a certain extent they consider their expertise as insufficient on this domain.

Waar dat ik mij soms aan - .. aan erger is dat allé, ik vind het belangrijk dat diëtisten, zeker diëtisten voldoende op de hoogte zijn van eetstoornissen en zeker van binge eating disorder. Ja, ik heb soms het gevoel van, ..Ja, ik word vooral kwaad van hulpverleners die doen alsof dat ze iets kennen over eetstoornissen en er eigenlijk niets van kennen. Want dat heb ik ook lang gehad hé, van ja dat mensen u maar behandelen en dat ze eigenlijk …

Surgeons are not the preferred professionals to give psychological support and dietary advice

In centres where no multidisciplinary follow-up is available it is often the surgeon who tries to take up some of these roles (e.g. coaching, psychological support, advice about diet and eating behaviour). While patients appreciate these efforts, they are not really helped by it.

Ongeveer een jaar later, het zal zoiets zijn, en dan in die periode na die ingreep moest ik dan om de zoveel tijd naar die chirurg die mij geopereerd heeft. Ik moet zeggen dat was een vriendelijke mens, maar eigenlijk, ik ga eerlijk zijn, ik had daar eigenlijk niets aan, aan die gesprekken. In de zin van, ja hij toonde mij dan eens zijn presentatie die hij moest doen voor een hogeschool over … . Allé hij had dan ook meegewerkt aan mijn boek hé. Ja, en als ik zei van oh het lukt niet goed. Jaja, je bent goed bezig. Terwijl dat ik het gevoel had van ja, maar dat was, zeker als het dan weer slecht begon te gaan, ja ik had niet het gevoel dat ik goed bezig was. Eigenlijk had ik daar niets aan.

Some patients do not see the need for specific dietary or nutritional advice

Some patients feel no need whatsoever to have specific dietary advice. They feel they are able to cope with their new lifestyle and apply a 'trial and error' method to see what they can eat. When such support is absent patients look up information via other (sometimes unreliable) sources (e.g. friends, social media, dr Google).

Je fais un peu comme je le sens. Si, il y a des choses qu'on digère plus. Tout ce qui est un peu gras, ça passe difficilement. Il y a fatalement des choses qui ont changé. C'est vrai que tout ce qui est friture et tout ça, on en mange très très peu. Fatalement, on change quand même un peu sa nourriture, hein.

3.1.6.6 Exercise therapy and sport

Increase of physical activity and start to sport is important to prevent muscle loss. This goes really well for some people while it is also often reported as the first thing that is abandoned by others (e.g. because of busy lives, work, feeling ashamed about their body). Patients indicate that it is helpful to organize some kind of support to help them to get started. This can be a sport session in group organized by the bariatric care centre or a few physiotherapy consultations. A problem with some of these programs is that they are discontinued during the summer break. Some patients consider the absence of a physiotherapist in the multidisciplinary team as a shortcoming. In some centres the need to sport and exercise is not discussed at all. In other centres it is advised to sport without any support. Some patients see the lack of support to start to exercise as one of the shortcomings in the care offer.

Que peut-être, un suivi kiné sport, comment on fait pour ceux qui ont eu des problèmes de cœur ou des choses comme ça, type clinique du dos. Peut-être un suivi comme ça, ça m'aurait plus pour avoir des exercices adaptés à la morphologie, à des problèmes de dos existants qui sont toujours là. Peut-être que ça, j'aurais aimé. Quelques séances encadrées.

3.1.6.7 Information needs

Lack of information provided by the team

Patients report that some information needs were not met during the post-surgery phase. This concerns several issues such as complications and side effects (including the importance of vitamin supplementation), medication use and lack of checklists for patients (e.g. which medications to avoid after bariatric surgery), pregnancy, the increased sensitivity to alcohol but also about the role of each caregiver (and who to contact) in the bariatric surgery pathway. In certain cases, patients mention they have received wrong message, for example regarding the reimbursement of aesthetic surgery.

…dat is dan bijvoorbeeld ook zo iets dat ik dan wel jammer vind en dat is dat ik bijvoorbeeld geen lijst heb gekregen met wat mag ik nog van mijn medicatie en wat niet. Als ik pijn heb aan mijn hoofd, mag ik een Neurofen nemen of een Ibuprofen of een Dafalgan of wat dan ook, mag ik dat nog ja of nee.

Et par exemple aussi, grossesse, pas grossesse, avec by-pass, moi, je pensais que c'était « plus question » et de mon boulot, j'ai soigné des femmes qui devaient faire des injections de vitamines, parce qu'elles voulaient tomber enceintes et qu'elles avaient eu un bypass, moi, je pensais que c'était incompatible, voilà, ça, je ne savais pas non plus.

L'alcool, on ne sait pas non plus ! Bon moi, voilà j'ai jamais été quelqu'un qui buvait beaucoup parce que j'ai l'alcool somnifère. Mais je sais qu'il m'arrivait d'être saoule avec un verre de vin, parce que j'avais pas mangé assez, parce que ci, parce que là. Et je sentais vraiment, au bout d'un demi-verre de vin, que waw ! J'étais déjà loin. Et je n'aurais pas voulu souffler dans le ballon. C'est des infos qu'on n'a pas.

C'est après l'opération réparatrice que je me suis rendue compte que je n'allais pas être remboursée. […] Et on n'en a pas discuté. Enfin, non. Dans, dans mes souvenirs, il y a eu un, un flou, je pense, autour de la question financière. I. Le chirurgien ne vous a pas fait réfléchir autour de ce sujet ? P.

Du financier ? Non. Non. Non. Et moi, j'ai…(silence) finalement moi non plus j'ai pas réfléchi. J'aimais, j'aimais pas, j'aime pas ce que je voyais et, heu…, et je pense que de toute façon, s'il m'avait dit : « C'est pas remboursé », je j'aurais peut-être postposé. Et encore, franchement et encore. Pas forcément…

While patients say they have received the 'theory' they often miss the practical implications (e.g. how to avoid and what to do in case of dumping). They also request tips and coaching about how to start behavioral change (e.g. start to exercise).

Le dumping, j'étais consciente. Mais, le dumping, sans savoir ce que c'est, enfin, je l'avais jamais vécu avant et quand on…(silence) enfin, voilà, y a parfois des moments où, où c'est vraiment compliqué et sans savoir ce que c'est, je pense qu'on se rend pas compte avant. On a beau expliquer les choses. Mais j'avais eu la théorie. Mais la pratique après, elle est différente. Heu…, chute de tension et tout ça, je sais pas s'il m'en avait spécialement parlé. Mais, heu…, et sinon après dans les autres, ben oui, y a le suivi. Il faut s'y, il faut s'y prêter. Mais, voilà, ça va avec, ça va avec l'opération et il faut, il faut suivre. Et sinon, c'est principalement ça.

Importance of social media

After the intervention, such as in the preoperative phase, patients are often very active on social media. They search information on the prevalence of symptoms, side effects and ways to deal with them. They also share practical tips (e.g. what to eat, recipes), etc. The high activity on social media might signal unmet information needs but also a way to ventilate their feelings. The information on social media is of course unfiltered. As a consequence, patients filter themselves what they think is reliable and helpful for them. For some patients the information is re-assuring and an important way to get in contact with peers while other become anxious about reading the unfiltered information on the internet. Some centres also set up social media platforms themselves which has the advantage to filter information (see Clues for potential improvement).

Je vais sur des forums, je lis, je m'informe[…] J'essaye de comparer en fait si... Parce que je sais que forcément, toute personne réagit différemment, tous les parcours sont différents. Et donc, je me dis que peut-être une personne aura des... enfin pas des symptômes, mais des ressentis plus ou moins pareils, mais c'est quand même assez compliqué. Mais parfois, si, je tombe quand même sur des personnes qui ressentent la même chose que moi, donc je me dis que c'est bon, que c'est comme ça, que c'est l'opération. Donc voilà, ça me rassure et c'est bon.

En ik ben ook wel blij hé, op Facebook ben ik met veel mensen bevriend. Ik ben ook heel blij als ik zie van oh die stelt het goed, allé, het lijkt toch dat ze het goed stelt. Maar ook ja, dat is dan ook het nadeel, op Facebook zie

je dan ook wie euthanasie heeft gepleegd, wie dat er zelfmoord heeft gepleegd allé, zie je ook hé. Dat is gelukkig een minderheid maar ja dat is zo het voor- en nadeel van contact houden met lotgenoten hé.

3.1.6.8 Reasons for non-adherence to follow-up and compliance

A large group of patients is aware that surgery is only one step towards a better life. They are aware that adaptations in their behaviour are required. Several patients report to be compliant and feel that they are motivated to be compliant with the professional advice and follow-up appointments. There is also a group of patients who thinks that the surgery alone is the solution and they do (not want) to understand that more is required.

C'est le début. Mais c'est vrai que pour beaucoup de gens c'est pas vu comme ça. Et c'est difficile, je comprends bien les médecins aussi. … Mais elles ne sont pas là pour les bonnes raisons, elles n'ont pas vraiment envie de changer leur mode de vie en fait. Elles ont juste envie de maigrir.

Want ik heb nog steeds mijn eetgewoontes, da, ik zeg dat altijd. Ik ben ni geopereerd in mijn hoofd, ik ben geopereerd in mijn maag. En da's 't probleem. Ik heb nog steeds een suiker- en een vetverslaving. Nog altijd. Die klik krijg ik nog altijd ni gemaakt

Yet, this is definitely not always the case. Patients have several reasons for non-compliance and adherence. We describe some of these reasons below.

Non compulsory character of post-surgery pathway

The lack of obligation is quoted by some patients as a reason for avoiding appointment. They do not feel the need or the added-value of the follow-up.

Ouais. C'est le cas pour le premier rendez-vous. Parce que la coordinatrice elle s'occupe de ce qui est préop. Mais après l'opération on est obligé à rien en fait !

Patients not compliant with follow-up are insufficiently approached by the centres

Some patients require assertive follow-up (e.g. active phone calls to motivate them to come to follow-up appointments).

… En als er iemand niet om de drie maanden hem belt, van ah, volgende week verwachten wij u, of ge hebt geen afspraak gemaakt.. Ja, dan gaat die ook niet naar die afspraak, hè, want hij maakt die afspraak niet. Want die afspraak van zes weken krijgen wel maar de volgende van zes maanden en van een jaar en van het tweede jaar, die moet je zelf maken. En, als niemand u zegt van, ah, ge moet die afspraak maken, ja dan maakte die afspraak niet als ge niet de discipline hebt om die afspraken zelf te maken, natuurlijk. En bij hem typisch is dat niet gegaan.

... toch denk ik dat het me zou geholpen hebben dat een hulpverlener zelf de stap naar mij zou zetten af en toe. Ook al weet ik ja dat ik moet gemotiveerd zijn en blablabla ook al doen zij de stap naar u hé, ja. Maar toch een beetje zoals ik daarnet zei van moest de diëtiste zo een keer bellen, moest die psycholoog een beetje bellen en zeggen van hey waar zit je of hoe is het? En dan niet altijd, want dat kost zoveel moeite van zelf altijd weer de stap te zetten ook al weet ik ja dat je het zelf moet doen hé, maar toch ja.

No immediate, visible impact of follow-up care

For some aspects of the care, patients see no immediate impact on their health or well-being and decide not to follow the professional advice (e.g. they stop the use of vitamin supplements).

momenteel denk ik dat ik al een jaar niets van supplementen neem. Er was mij ook verkeerd uitgelegd hoe dat ik ze moest nemen. Dus ik nam die 's morgens allebei samen. Blijkbaar mag dat niet. En ik was daar altijd slecht van, altijd diarree had ik daarvan. En dan ben ik gewoon gestopt met die vitamines te nemen. En ik moet eerlijk zeggen ik heb momenteel van niets geen last. Maar ik zou misschien wel beter mijn bloed een keer

laten trekken om te controleren of dat ik iets tekort heb. Waarschijnlijk ga ik wel iets tekort hebben, maar ik weet het gewoon niet.

Care offer is not clear or not available in a timely manner

Some patients experience problems or see the need to look for professional support to change their lifestyle or eating disorder but do not know who they should contact. Others have to wait too long to get an appointment and drop out because of this.

Et au jour d'aujourd'hui, qu'est-ce qui fait que vous n'allez pas chercher ce professionnel ? Par manque de temps, parce qu'il faut gérer mon agenda autrement. Voilà. Et puis, je sais pas à qui m'adresser, tout simplement. Donc ben oui, il faut changer de vie, il faut bouger, il faut changer. Mais à qui je demande ? Intervieweuse : Vous ne savez pas à qui vous adresser ?Du tout. Du tout. Est-ce que c'est un psy, est-ce que c'est un psychiatre ? Est-ce qu'il y a des coachs, des gens qui travaillent tout ce suivi thérapeutique et qui peuvent éventuellement nous aider ? Voilà. Ça, c'est pas que je n'ai pas posé la question, il m'a dit : « je vais regarder, et je reviendrais avec l'info », j'attends encore.

Relationship with and trust in caregiver

Some patients stop the follow-up because they have 'no click' with the caregiver involved. They prefer to be followed by someone else but have the feeling they do not have the choice

Je suis suivie donc par le diabétologue, et il y a des diététiciennes. Le problème c'est qu'une fois qu'on a été opérée du bypass, c'est toujours la même en fait qui revient dans cet hôpital-là. Et ça... (silence) je ne veux pas. Donc voilà.

Lack of positive coaching

For some patients it is not motivating if their efforts are not acknowledged by the healthcare professionals. If they have the feeling that they only receive feedback about what they do wrong or don't do enough (e.g. they exercise but not at a high enough intensity) they risk to get demotivated.

Et le jour… enfin, à l'hôpital, pour faire partir les gaz, on m'a dit : « L'important c'est de beaucoup marcher. » Donc, déjà, à l'hôpital, je marchais dans les couloirs et dès ma sortie euh… j'ai repris ma marche, maintenant pas une demi-heure parce qu'il y avait des douleurs, ce n'était pas facile, peut-être 10 minutes ou un quart d'heure et j'ai allongé et je suis vite revenue à ma demi-heure. …. : « Oui, mais la marche… » Il m'a un peu houspillé, il m'a dit : « Oui, mais il faut du sport plus intense. » Et là, ça m'a cassée, si on me met la pression, si on est négatif, etc., ça me bloque. … Oui et dire qu'il fallait absolument autre chose. « La marche, il faut vraiment autre chose. » Là, ça m'a bloqué et malheureusement, je n'ai plus été marcher en me disant… ça m'a bloqué et d'un côté, au début, je me suis dit : « Allez, je vais rechercher plein d'informations. » Donc, j'ai recherché, dans un premier temps, ça a quand même eu du positif, j'air recherché au niveau natation, au niveau… mais je ne savais pas trop vers quoi aller.

Not motivated enough to sport

Exercise and sport is a very difficult issue for many patients. While several patients succeed to increase their physical activity after surgery it is also something which they risk to drop quite easily (e.g. because of busy lives, never been sportive, not motivated enough, nobody to sport with, feeling ashamed about their body, lack of energy). In addition, sport is often presented as something additional (a nice to have) rather than something that should be done.

Neen, ik echt nee. [Lacht] Ik denk dat wel hé, omdat ik... ik heb zo iemand en dan stuur ik 'Kom we moeten echt gaan sporten' maar het komt er gewoon niet van. In principe, ik ben dan -nee, da's een excuus hé, dat weet ik heel goed- maar ik ben van 9 tot 7 weg, ik ben moe, ik probeer mezelf eigenlijk vooruit te werken. Ik werk 40 uur per week. Euhm, da's geen excuus.Maar ik ben wel moe als ik 's avonds thuiskom. Neen, ik heb geen energie om te sporten en ik heb hier alle materialen gekocht.

Voor mijn bypass heb ik hier alles gekocht. Ik heb beneden een fitnessruimte gemaakt [Lacht]... Ik heb er nooit gebruik van gemaakt. Ja. Neen. Ja, eigenlijk zou 'k moeten, maar...

Time/Practical implications and busy lifestyle

For some patients it takes them too much of their time to make the journey. For others the hours of treatment cannot be combined with their busy (professional) lives.

Goh, ik sport nu wel niet, dat niet. Ja, ik werk al, euh, vier dagen in de week en nummer 5 is hier, euh, huishouden en 'k heb dan nog een man die zelfstandig is, dus, euh, mijn dagen zijn heel goed gevuld. [Lacht] 'k Zou eigenlijk niet weten wanneer dat 'k dat nog zou moeten doen maar 'k zou dat eigenlijk wel moeten doen.

Nee, maar ik denk wel moest je nu inderdaad moest je dan bijvoorbeeld wekelijks of zo naar de psycholoog gaan, dan wordt dat ook wel een dure grap. Allé dat is ook zo, de diëtiste in Jette zei ook, ja ik ben maar één keer gegaan want de eerste keer betaal je dan meer en de andere keer dan wat minder, maar ja. Ik denk dat dat nog eerder soms het praktische is van dat je moet kunnen euh daar geraken of opvang voor de kinderen voorzien of vrijaf nemen of allé zodat je moet. Ik denk dat dat soms nog moeilijker euh is, ik denk dat dat ook relatief is. …

Ashamed about 'failure'

Some patients feel the need to see a healthcare professional but do not make the appointment because they feel ashamed about their weight regain or are afraid about the reaction or message they will receive.

Nee, want ik zit eigenlijk nu ook met veel vragen hoor. Van in de zin, oké ik heb nu al een tijdje terug eetbuien en ik vraag mij soms af van ja hoe groot is die maag nu eigenlijk. Ik stel mij ook de vraag van, kan die terug verkleind worden. Allé, ik weet het niet, eigenlijk heb ik wel een aantal medische vragen nog. Ja allé, goed, ik moet een afspraak maken en ik kan ze stellen de vragen maar het is toch wel een drempel om daar terug naartoe te gaan, en allé het is gewoon heel confronterend. Van ja, ik ben hier terug, misschien zou ik het een keer moeten doen, maar ik heb ook schrik voor het antwoord.

On se dit qu'on ne gère pas, voilà. Donc il y a une honte à aller retourner, à retourner voir le chirurgien. Et puis, qu'est-ce qu'il va vous dire ? Il ne va pas vous dire : je vais vous réopérer demain. Donc il va vous dire d'aller revoir la diététicienne, qui va vous dire que vous ne mangez pas ce qu'il faut ou que vous ne bougez pas assez. Donc on est de nouveau dans un schéma un

They feel that they have no need for support

Some patients are confident that they can manage their care and lifestyle changes themselves. They do not see the added value of professional support.

Naar de chirurg en dan euh dan ook met de verpleegster, de diëtiste heb ik na een maand of 8 gezegd dat is aan mij niet besteed. Dat is, ik word er zenuwachtig van. Ik weet dat ik gezond moet leven, en dat ga ik ook doen. Dus ik ben van 107 naar, ik ben in 2014 ben ik geopereerd hé, begin 2014, en nu ben ik toch al meer dan anderhalf jaar 64. Dat blijft.

Financial aspects

When the lack of explanation is combined with the lack of reimbursement, patients are not stimulated to go to dietician and psychologist consultations and to follow advices in long term (such as sport or vitamin supplements).

Ja, ik zeg nog een keer, psychologen en allemaal, het kost allemaal, we hebben ook redelijk veel financiële tegenslagen gehad. Mama is gestorven, ik heb enorm veel moeten argh betalen. Dat ik niet wist. Dus ja. En vroeger ook van mijn man op zijn werk. Helemaal op nul moeten beginnen. Dus ja het komt een beetje, dat het tot daar zit.

Ik kan dan wel vitaminen bijbetalen, van Fit for me, kost ongeveer 75 euro voor zes maanden. Hoe lang ga ik dat moeten innemen? Dat hebben ze in het ziekenhuis niet gezegd. Ik heb dat zes maanden gepakt, ik ben daar nu drie weken mee gestopt. Ik ga dat niet blijven betalen, ook niet absoluut eigenlijk dan toch.

3.1.6.9 Role of GP's in follow-up

The level of involvement and the role played by general practitioners in the post-surgery bariatric care pathway is highly variable. The GP is reported to be absent (no GP at all or GP not involved in bariatric surgery pathway), a passive partner (e.g. regularly updated and informed), an active partner (e.g. responsible of part of the follow-up care such as lab testing) or the responsible person for follow-up (e.g. this mostly concerns long-term follow-up).

Not involved

Some patients do not have a GP or chose not to involve their GP in the bariatric care pathway (e.g. because they know that their GP is not in favour of bariatric surgery).

Et donc, vous n'avez pas dû faire appel à l'équipe pluridisciplinaire. Quelle est la place du médecin généraliste là-dedans ? Quasi nulle. ….I le sait parce que... enfin, elle le sait parce que voilà, c'est à signaler, il y a des anti-inflammatoires avec un bypass voilà. Donc elle le sait par la force des choses, mais on n'a jamais parlé ni de ma perte de poids ni de voilà.[…] Elle est inexistante dans le parcours.

Er is geen enkel moment geweest dat ik met mijn huisarts daar ben over gaan spreken.

Nu achteraf gezien had ik het misschien beter gedaan want mijn huisarts is absoluut anti bypass. Die predikt daar nu nog steeds over. Als ik daar ga voor een kwaaltje, dan "Had ge maar niet moeten laten doen".

Passive partner in bariatric surgery follow-up

Several patients report that their GP is aware and regularly informed about the bariatric surgery follow-up care but that they are not an active partner. Patients continue to visit their GP for other reasons. While these problems at first sight might not be linked to bariatric surgery they might well be. Therefore it is important that the GP has sufficient knowledge about bariatric surgery.

Je sais qu'elle se renseignera auprès de la psychiatre et de la nutritionniste parce qu'elles se connaissent, elles sont amies, donc je sais que je suis surveillée, mais non, je n'ai pas été retrouver… si j'ai été voir mon médecin traitant pour enlever les agrafes. Donc, quelques jours après, c'est très rapide aussi, euh… j'ai été opéré, j'ai été 5 jours après, ça aurait pu être plus court, mais il y avait eu le week-end, donc j'ai été 5 jours après. Elle m'a enlevé les agrafes et la cicatrisation se faisait bien, donc j'ai pas eu besoin d'y retourner. Voilà, sinon je ne l'ai plus revue depuis, elle n'intervient pas vraiment.

Active partner or responsible for long-term follow-up but often limited to lab testing

Some patients do not see the need to be followed by the specialised centre. They think this can be done by the GP. Other patients report that after an initial follow-up by the medical specialists after a while (when their medical condition is stabilized) the care is taken over by the GP. This requires a good communication and collaboration between the bariatric care centre and the GP.

An important element in the follow-up care is lab testing. This is reported to be done by the GP in several cases. Yet the frequency seems to differ.

Et, et les prises de sang, vous en faites encore de manière régulière ? Oui. Je viens d'en faire une ces derniers mois. Ça fait deux semaines. Chez mon médecin. Chez le chirurgien, j'en ai jamais passé.

Dat is bij de huisarts dan laat ik mijn bloed trekken, kijken of de waardes in orde zijn, eiwit, ijzer, vitamines. En daar staat er iedere keer vitamine D maar ja ik ga daar supplementjes voor pakken. Iedere twee weken, dat is dan zo vitaminen, ijzer, zoveel water ik vind dat echt niet lekker [lacht], maar anders is er wel goede opvolging. En ik volg het ook zelf redelijk veel op. Dus euh dat is wel goed.

Long and good relationship with GP

Several patients report to have a good and long relationship with their GP. GPs know the history of the patient and patients have a lot of confidence and trust in their GP. As such it is often the first person that they will contact in case of delicate problems (e.g. relational, psychological). If there is a good relationship, patients often report to receive a lot of support (e.g. positive coaching) from their GP.

Pas op een huisarts, die kent u eigenlijk binnen en buiten hé, die weet elk kwaaltje en elk dingetje dat je hebt. Maar ik vind, zoals het centrum overgewicht en alles, dat die nog meer, allé, nog meer hun best moeten doen voor u ook een beetje in uw kop te kijken. Ook te zeggen van ga maar zitten en niet van doet, ga maar op de weegschaal amai jongen je bent goed afgevallen. En dat is natuurlijk ook, dat geeft een steun maar ja …

Ben mon généraliste, je pense. Si je dois me tourner vers quelqu'un, c'est vers lui. ..... Et lui, enfin voilà, lui je peux lui poser toutes les questions que je veux. Voilà. Depuis, ça fait 20 ans qu'on se connaît. Et donc j'avais changé parce que, il habite loin.

Importance of expertise about bariatric surgery

Some patients report that their GP has insufficient expertise in the required care post bariatric surgery which can result in wrong advice (e.g. advice patients not to take vitamin supplements). In addition, some patients mention that they were referred too late to specialist care in case of problems (i.e. the GP doesn't recognize the 'red flags' that are important after bariatric surgery) or prescribe medications that are not adequate or contra-indicated post-surgery. This can be potentially harmful. Yet, also on other non-strictly medical domains the impact of bariatric surgery is insufficiently known by the GP (e.g. sexual difficulties and relationship problems). It is however important that the GP is aware of the consequences and potential risks of bariatric surgery. After all it is often the first person that will be contacted by a patient in case of symptoms/problems (e.g. abdominal pain, dumping symptoms). So even when patients are still under follow-up in the bariatric care centre it is very important that the GP is aware about bariatric surgery aspects of care.

Euh, op een bepaalde periode toen dat ik die tekorten allemaal had. … 't Is haar [de huisarts] terughoudendheid geweest in de vitamines die die die mij vooral het afwachtende van nee en we gaan niet te veel geven, we gaan we gaan weinig geven. Op zo'n manier heeft het heel lang gesleept dat het niet doorgedrongen was, da 'k toch wel meer dan gewoon iemand die efkes een tekortje heeft, eh iets nodig had. ..

Communication between bariatric care centre and GP

The communication between the bariatric centre and the GP is often suboptimal and slow. The GP is often unaware about the follow-up of the patient by other healthcare professionals.

D'ailleurs le médecin traitant je vous dis, il est un petit peu éloigné, si je ne lui dis pas : le diabétologue m'a vu cette semaine, il m'a dit ça, ça, ça. C'est pas qu'il a eu le retour, or, parfois c'est lié à tout un état de santé que je traîne depuis des semaines, des semaines, et qui lui permettrait à lui de voir un petit peu plus clair aussi par moments. Donc ça, c'est manquant parfois. Ouais...

dat is door heel het traject wat ik echt ervaren heb die een tekort was, de samenhang tussen de verschillende disciplines en de verschillende dokters, euh de koppeling met mijn huisarts – euh, een brief heen en weer is niet genoeg- huisartsen zijn op dit moment, denk ik, niet altijd voldoende op de hoogte euh en er is mij gezegd geweest van 'je kan vitaminetekorten hebben en dat komt zeer regelmatig wel voor, hé, maar we zullen je multivitaminen geven, daarmee zal het opgelost zijn maar zo simpel is het allemaal niet geweest [R lacht]… 't Is toch wel complexer geweest

3.1.6.10 Work related issues

Some patients hide their operation to their colleagues and quickly return to work after the surgery while others describe their pathway in details to their colleagues.

I. Et dans votre vie professionnelle ? P.(Tousse) Je ne l'ai pas dit non plus... Mais moi, je suis un peu une excessive par rapport au travail, donc j'ai été opérée, je pense, un lundi matin, et le lundi suivant j'étais de nouveau au travail à temps plein…….I. Mais alors, vous ne l'avez pas dit, mais ils ont vu. Ils vous ont vu changer ? P. Oui. Oui, mais finalement ça reste un gros tabou. Donc c'est un sujet qui n'a pas été beaucoup discuté à mon travail.

Non. J'ai, j'ai tout raconté. J'ai même une personne avec qui je travaille qui est vraiment chouette à qui j'ai dit : « Ecoute, je vais faire ça, et ça et ça parce que moi, je me sens pas bien ». Elle m'a dit : « Écoute, si tu veux prendre un mois, deux mois, prends ton temps, je serai là pour toi ».

Several patients mention they received real support from their colleagues but they had to explain sometimes the reasons of some of their new behaviour (e.g. eating more than 3 times/day).

Mais effectivement, oui, non ça ne me gêne pas d'en parler, de raconter, d'expliquer comment ça va ou comment je gère. C'est très drôle parfois des nouveaux, où tout à coup dans une discussion ils apprennent que j'ai un bypass. Et quand je montre la photo d'avant opération ils me disent : « waouh, impressionnant ». Donc voilà. Donc c'est très drôle, c'est positif quoi. Ça fait du bien de se dire : ben oui, c'était moi. (Rires)

Non. Les gens sont compréhensifs. Donc, j'y arrive. Heu…, j'ai aussi du caractère. Donc, quand quelqu'un me fait la remarque, à me dire : « Tiens, c'est la troisième fois que je te vois manger quelque chose ce matin », ben, je lui explique tout simplement et la personne finalement se sent plus bête après d'avoir fait sa remarque qu'autre chose. Mais, heu…, mais… voilà.

3.1.6.11 Patients' feelings

Despite the high level of patients' satisfaction after bariatric surgery and many positive aspects mentioned by them, some ambivalent feelings emerge from the interviews. The results concern the impact on weight, physical health, body image, psychological health and social relations.

Weight evolution

For some patients, their new weight makes them happy, while it can still be more (or less) than a normal weight.

"Là j'étais vraiment maigre, mais ça me plaisait. Croyez-moi ça me plaisait. C'est cool quoi. J'avais l'impression de ravoir 16 ans. … Donc revenir à 66, c'est vraiment le poids que j'avais quand j'avais 17 – 18 ans, je ne sais plus. Je me souviens que c'était des années merveilleuses. Donc ces années merveilleuses sont revenues à la vitesse de la lumière."

However, patients evoke also negative aspects in the weight loss such as a too important weight loss, or a sufficient loss of weight that is associated with a decrease of muscular strength or followed by an unsatisfactory weight regain.

"Donc voilà, je n'avais pas d'illusions sur le fait que j'allais garder... heureusement d'ailleurs ! Parce que 65 kilos j'étais vraiment trop maigre (Rires), c'était vraiment dur. Au départ je ne me reconnaissais plus sur les photos. La première fois que j'ai reposé pour des photographes, j'ai dit : « non, c'est pas moi ça. » (Rires) Donc, voilà."

"P: De spieren, hè. De spieren verzwakken heel… heel hard. Euhm, en het is ook weer, dat hangt ook samen, had ik misschien wat meer gedaan, qua sporten ofzo dan had ik mijn spieropbouw ook wat meer gehad, denk ik. maar ja, het is ook den tijd. Ik weet dat zijn uitvluchten, hè"

"Uw maag kan weer uitrekken en dat is bij mij gebeurd. Mijn maag is uitgetrokken terug en ik kon weer alles eten. Veel meer dan dat ik mocht, eigenlijk. En, eigenlijk was dat weer zo, weer zo wat kilo's bijgekomen…."

For patients, it is paramount to have control on the weight. This leads to certain behaviors, mainly in the short term after the intervention (e.g. sport or regularly weight monitoring to stay motivated). In some cases, the weight monitoring becomes an obsession because each gram lost provides feeling of happiness.

"Vroeger stond ik in het begin na mijn operatie om de zoveel dagen op de weegschaal om te kijken wat er af was maar nu is dat al een stuk minder, één keer in de maand of één keer in de week. Dat is te zien. In begin zit je te denken, alé ge moet nu niet te veel op de weegschaal gaan maar op den duur kan dat wel een teleurstelling soms zijn. Het is daarmee dat ik dat nu ook zo wat…"

« Ouais, ouais, mais ça (se peser), ça me motivait encore plus. Puisque tous les jours je perdais... 100 grammes, 50 grammes, 42 grammes. Tout le temps ! Je vous jure. Quand ça dure comme ça pendant un an, un an et demi, que vous avez jamais rien perdu, [...] (souffle) c'est comme si je gagnais au loto tous les jours ! »

Physical health

Weight loss is associated with a lot of positive issues that lead to an increase in physical activities: feeling of energy, easier movements, increase in physical resistance, etc. which can be fully appreciated by patients.

"Ah, ik denk... grootste voordeel is dat ik, is dat ik gewoon veel gezonder ben, Dat ik, euh, allé, dat mijn energieniveau veel op… Ik heb een redelijk druk leven zeg maar, zeker met het kleintje nu, en het voordeel is dat je gewoon veel meer aankan."

« Parce que comme j'étais ronde, par exemple faire de l'accrobranche c'était : « mais enfin, comment je vais faire ça ? ». Maintenant je suis comme un petit (tic-tic). Je fais plein de choses. Et ça, cette liberté-là de son corps pour soi, c'est impayable.»

"Ja, het feit dat ge veel meer energie hebt, allé dat ge kunt sporten en dat ge, ja ik denk, als 'k ik nu 20 km zou moeten lopen voor en ik zou daar iemand blij mee maken of... ik denk dat ik dat echt wel op karakter nu zou kunnen, terwijl dat 'k dat daarvoor niet zou kunnen, dus het feit dat ge zoiets allé ja, dat ge eigenlijk mee sportief kunt zijn, dat vind ik wel een belangrijke."

"Et alors au point de vue physique, aussi. Quand je marche dans la rue, je suis pas essoufflée. Alors qu'avant j'arrivais en plus, j'en pouvais plus. Enfin, si, non, c'est chouette quoi. Et pour mon fils, on fait de la trottinette. On fait du vélo. On fait plein de trucs."

Patients experience that the weight loss also has a positive effect on their physical health, sleeping pattern, etc. Patients also report that the obesity related comorbidities decrease.

"Oui, oui, oui, parce qu'en plus, j'ai des apnées du sommeil. Depuis que j'ai maigri, j'ai pu dormir dans le divan, sans l'appareil, avant je n'aurais pas osé, j'ai un mal de crâne quand je me levais. Maintenant, je peux dormir une heure, je ne dors pas non plus… Je dors une heure, je n'ai plus mal la tête quand je me réveille. Donc de ce côté-là, ça pourrait aussi s'arranger"

"R: Ja, maar , je moet dat, dat was de laatste hoop hé. En ondertussen pak ik geen één pil niet meer. Geen één. Mijn bloeddruk dat moet ik regelmatig in het oog houden, daar twijfel dat ik misschien terug een kwartje ga moeten nemen. Maar euh, dinge, cholesterol, suiker, euh maagzweer ja, ik heb geen maag niet meer bij"

However, some patients evoked also deception because some comorbidities persist or because there are negative physical impacts of the bariatric surgery due to complications or side effects.

"Non, enfin, mes genoux sont toujours abîmés, ils seront toujours abîmés, ça n'a rien changé, la perte de poids n'a rien changé. Ça, ça ne m'a pas aidée. L'hypertension artérielle n'a pas changé non plus, ça… Quelque part, ça… Je dois avoir un terrain prédisposé, mais sinon, je veux dire, je n'ai pas de problèmes de transit, au contraire, je suis plus constipée qu'autre chose, le problème, on dit que c'est de la bouche à l'égout, non,

pas du tout, je sais manger de tout, mais en petites quantités. Par exemple les pâtes, le riz, le pain, c'est plus… mais je sais manger un américain préparé sans problème."

Body image

Patients develop also ambivalent perception regarding the evolution of their body image after bariatric surgery. Even those happy with the weight loss mention some negative points such as the hanging skin or the decrease of breast size. Some patients need time to be psychologically familiar with their new body image. For others, this situation is disappointing, leading to severe depressive feelings.

"Als ge ziet, mijn trouwfoto daar. Ja, da' s een groot verschil met nu [Lacht] en ik had toen al heel veel last van veloverschot op mijn armen en zo, maar euh na mijn trouw is dat in mijn hoofd beginnen ratelen van 'ge zijt zo dik terug geworden en ge zijt lelijk en... En nu, nu ben ik 30 kilo afgevallen, nu heb ik besloten voor mezelf het afvallen is genoeg geweest. Ik ga nu aan mijn traject beginnen voor mijn huid te laten verwijderen, want nu is mijn hoofd vooral gezet op het feit dat dat huidoverschot degoutant is en dat dan weg moet en dat in de weg hangt en want ik ben wel 30 kilo afgevallen maar ik zie dat niet. Ik merk dat wel aan de kledij dat 'k moet veranderen en zo maar toch zie 'k ik niet van 'ge zijt een pak magerder dan een jaar geleden. "

"P : À une période, maintenant je ne sais pas, mais à une période j'aurais aimé avoir accès à la chirurgie esthétique. J'avais envie de remonter les seins parce que ben voilà, ça va... Je n'ai vraiment pas à me plaindre. Et j'ai deux petites poignées ici. I: De peaux ? P: De peaux. Enfin voilà, parce que le ventre, voilà, s'est affaissé. Comme je dis à ma fille, j'ai un nombril qui boude. Voilà. Mais ce n'est pas énorme. J'ai pas besoin non plus d'enlever un tablier. C'est juste une question de joli quoi. Donc danse orientale, avoir le ventre nu."

Moreover, despite the loss of weight, patients do not feel they are slim.

« Ah mais toujours maintenant, je me regarde dans un miroir, je me trouve toujours aussi grosse. C'est toujours le plus dur. Je pense que ça ce sera toute ma vie comme ça. »

"Bij mij persoonlijk wil mijn hoofd niet mee met het beeld dat ik zie in de spiegel.

Ik voel mij nog altijd dik. Terwijl dat iedereen nu al zegt tegen mij van Prisillia het mag nu wel stoppen hé. Het is genoeg geweest. Nu ja, we kunnen er zelf geen stop op zetten hé."

In some cases, they need an external view, from their family or friends, to accept their transformation and for example to choose clothes at the right size.

« I: Et qu'est-ce qui a fait que petit à petit vous avez changé de rayon ? P : Parce qu'à un moment donné j'allais parfois avec ma maman qui me disait : « mais enfin non, c'est pas là que tu dois aller, c'est de l'autre côté ». … Et puis quand j'allais avec mon compagnon et que j'essayais des trucs trop larges il me disait : « mais enfin c'est trop large ». I. Donc il vous a fallu un œil extérieur ? P : Oui, vraiment."

".. Euhm ik ga bij mijn vriendin dan die morgen wordt geopereerd, mocht 'k ik een heleboel kledij gaan halen. Die stopt mij een broek 44 in mijn pollen. Ik begin die keihard uit te lachen. Ik zeg: dat gaan we niet doen.En die zei: past toch maar eens en die ging aan en ik kreeg die toe en ik zeg 'how, terwijl ik in mijn gedachten van 'ok ik heb die 48 niet meer nodig, we zitten aan een 46, neenee we zitten aan een 44 dus, ja dat is moeilijk."

<u>Psychological health</u>

Patients mention a return to "normal" or a better psychological health after bariatric surgery mainly because they feel an increased confidence due to weight loss. Some patient experience it as a "revival".

« On se dit (Hésitation), c'est le mot qui revient et on le caractérise tous avec cette opération c'est « renaissance ». [...]C'est vraiment ce mot-là qui vient pour ces opérations-là, et beaucoup, j'en vois beaucoup, c'est ce

terme-là. Parce que, on se refait, oui, une garde-robe. On se refait une santé. On a plus confiance en nous parce qu'on se dit : ben oui, on arrive à s'accepter maintenant telle que l'on est avec cette perte de poids, et parce que c'est possible. »

A search of perfection is quoted by some patients.

« Mais vraiment, depuis l'opération que je suis plus mince, que j'ai plus d'estime, ben maintenant en fait j'essaye vraiment on va dire, la perfection. Parce que je serais jamais parfaite, forcément personne n'est parfait. Mais je pense que l'opération nous fait faire des choses qu'on n'aurait pas fait forcément avant. Après, bon une personne n'est pas l'autre, mais moi c'est comme ça que je le vis. C'est tout le temps vouloir, tout le temps vouloir trouver quelque chose à faire pour être mieux pour avoir une bonne image. »

Quality of life increases… at least temporary

"Door de operatie dan? Ja, het positieve is natuurlijk levenskwaliteit hé, die opgebouwd werd. Negatief euh ja, het enige dat ik nu denk negatief is van oh het is zo weer iets dat ik op mijn lijstje kan schrappen dat niet helpt allé. Dat gevoel zit ik nu mee in, zo van ja allé. Ik moet nu weer iets gaan zoeken, iets anders zoeken dat misschien gaat helpen. Euh, door de operatie negatief? Niets eigenlijk. Behalve dat er hoop, dat er hoop weer een stukje weg is. Wat dat niet niets is natuurlijk. Dat is het belangrijkste hé, dat er weer iets niet werkt."

But negative feelings are also mentioned regarding the psychological health after surgery… Some patients mention a guilty feeling because they do not lose sufficient weight or because of their behaviour. Others become stressed, claiming for action,...

"Ja, omdat ik denk dat mensen, ik denk, veel te veel waarschijnlijk, ik denk dat mensen denken dat het euh vanzelf gaat met een operatie. Dat je daar toch hulp voor krijgt, dat het nu toch wel echt moet lukken allé lukt dat nu nog niet, zelfs met een operatie? Zo denk ik dan wat mensen denken, alhoewel dat zo allicht niet is. Maar euh, ja, dus ja dan schaam ik mij daarvoor, ik durf dan niet. Ik durf dat, ik vind dat moeilijk om daarover te praten en allé om tegen mensen die zeggen ah je bent precies een beetje vermagerd. Ik ga dat dan nog eerder weglachen of ja dan … ..

"Je suis plus tendue, plus nerveuse, plus stressée. Avant je laissais encore couler, chose que je ne sais plus faire du tout. Je ne peux pas supporter de voir quelqu'un assis une demi-heure. Chose qu'avant, ça me posait pas soucis du tout. Je vois mon mari parfois assis un quart d'heure, vingt minutes, je vais lui dire qu'il n'a rien fait. Or, un quart d'heure – vingt minutes (rires). Voilà, ça, ça me stresse énormément."

Relationship with partner

The psychological change of the patient can have an impact on the relationship with their partner and it is not always positive. In some cases, the increase of energy and self-confidence can lead to more activities, more requirements, a kind of intransigence… In others cases, the change is marked by a loss of humor, a darker character.

« J'ai profité de ma vie de femme célibataire aussi, avec les atouts que j'avais à ce moment-là, évidemment ! Donc j'ai fait le choix aussi d'avoir une vie, comment je vais dire (Hésitation), j'ai profité pendant quelques mois du succès que je pouvais avoir sans attache. Et puis maintenant, voilà. Maintenant j'ai dit voilà, c'est bon, ça m'a fait du bien, tranquille maintenant je m'occupe de moi et on verra la suite après.»

"Ce n'est pas évident. Il y a aussi des variations de la libido après l'intervention, donc c'est tous des trucs qu'on va gérer comme ça quand ça arrive.[…] Parce que vous perdez des kilos, vous vous retrouvez avec des peaux qui pendent de partout. Sexuellement ça va se passer comment ? Comment vous allez gérer ça ? Est-ce que la personne va vous supporter comme ça ? (Silence) Qui parle de ça ? Personne ne parle de ça. »

Social relations in general

Social relationships can be impacted in different ways linked to the bariatric surgery. People feel that they are treated in another way because they look more 'normal'.

« Ik zie heel veel mensen. .. Dus als ik nu mensen tegenkom, da 'k vroeger heb gekend toen ik dik was, merkt ge ook dat die mensen anders reageren. Terwijl die mij vroeger hadden voorbij gelopen, hebben die nu gezegd van 'amaai Bo, ge zijt veranderd, ge ziet er goed uit'. En dan denk ik van 'Mm, mm, niet met mij'. … Ook qua vrienden, veel vrienden dat ik ben kwijtgeraakt die zeiden van 'ge zijt veranderd', euhm, ik ben veranderd, maar ik ben nog steeds mezelf gebleven. Dus… »

The physical and psychological changes after the bariatric surgery but also the relation with food and alcohol can also have an influence on their relationship.

- Physical changes: With the weight loss, a new body appears which can be more attractive and lead to another regard from persons of the opposite sex or even in general. This can be felt as a positive evolution, helping to have a new relationship. However the new body can also create some concerns such as a jealousy feeling from others or a kind of superficiality within the relationship.

"Euh, dat sowieso wel, omdat ik denk dat mijn, allé, ik denk het niet, ik weet het wel zeker, dat mijn leven heel lang on hold gestaan heeft door zoveel overgewicht te hebben. Ja, een relatie, hoe moet ik het zeggen zag ik niet zitten. En een keer mooie kleren kunnen aandoen. Ik kan het nu ook weer niet meer hé. Ja, ik heb het gevoel dat dat mij heel veel kwaliteit van leven gegeven heeft. Weliswaar is dat nu weer aan het afnemen die kwaliteit, maar ja vooral een relatie. Ik denk dat mij dat echt een relatie opgeleverd heeft, het heeft mij heel veel kwaliteit gegeven, ook al is het, twee-drie jaar geweest."

« Mais c'est vrai que voilà, il y a la peur de rencontrer quelqu'un et de me dire, ben oui, il veut juste une histoire sans lendemain, il cherche pas de la solidité, il ne veut... Quand j'étais ronde, quelqu'un qui s'affichait avec moi, c'était quelqu'un qui était prêt à... Je le voyais autrement."

- Psychological changes : The impact of psychological changes can affect the family members, the colleagues and relatives. This can be positive, with easier access to other people or neutral, with a kind of autonomy. But the psychological changes can also hamper the relationship because of emotional issues.

« Je m'isolais de tout le monde par ce manque de confiance en moi. Et ça déjà, ça a changé parce que je prends... on prend confiance en soi et on va vers les gens. »

« Ben ça me perturbe, et puis ça me cause quelques soucis dans le sens où je suis beaucoup plus émotive aussi. Quand je vois qu'on ne me répond pas ou qu'on ne fait pas ce que je demande, je suis très émotive et je me mets à pleurer. …. Mais quand c'est au niveau du travail, parce que ça va jusque-là, c'est compliqué. Là c'est plus compliqué. Et les gens ne me connaissent pas et ne savent pas que voilà, il y a un changement aussi dû à ça. Donc pour eux c'est moi qui deviens folle. Voilà. Elle est pas très nette, elle est dépressive. Cette semaine on m'a dit que j'étais dépressive, qu'il fallait que je me soigne. Or que non, je suis stressée parce que j'ai l'impression qu'on ne m'écoute pas, et que j'ai besoin qu'on m'écoute quoi. »

- Relation with food : For some patients, social life is not so easy after bariatric surgery because they cannot eat as previously, at home or outside home.

"Oui. Oui. Oui... maintenant voilà, c'est pas toujours... On mange un repas sur une longue durée, etc. On arrive au dessert (silence), je sais que ça va être une difficulté. Mais j'ose pas non plus, voilà je pourrais en effet dire aux gens : « je ne sais pas en manger, etc. », mais je veux pas blesser non plus, donc forcément je me force un petit peu. Et ça... C'est pas toujours l'idéal parce que je paie les conséquences après."

"..Of op restaurant gaan is ook wel al een uitdaging want iedereen bekijkt u dan al van 'hoeveel gaan ze eten en wat gaan ze hier eten'. Dat stoort mij zo meer."

In order to continue their social activities, some patients develop strategies in food management such as choosing a kid menu or just an appetizer in a restaurant.

"Euh, als wij gaan eten of gingen, nu ben ik dat allemaal gewoon natuurlijk, maar in het begin is dat lastig want dan ja is dat van ja mensen wat eten jullie allemaal op, maar krijgen jullie dat binnen? Nog, dus als wij gaan eten dan vraag ik een voorgerecht als hoofdgerecht. Of ik vraag een kinderschotel, en als ze daar niet mee akkoord zijn, ja dan ga ik op een ander hé. Maar euh, dus dat is ik denk bij heel veel mensen want ik heb ook wel de indruk dat er ook mensen zijn die zoiets hebben laten doen, die ook wel terug dikker worden ook."

« Heu ben ça ne m'a pas empêché, c'est juste que ben j'ai appris à… je prenais un menu enfant, s'il n'y a pas de menu enfant, je prenais juste une entrée heu on prend l'habitude à avoir son petit doggy bag, du moins moi c'est c'est ce que j'en ai fait. »

There are also patients who feel no impact on social life due to their food relation.

« Mais il m'avait dit : « Voilà, au niveau social, ça va très fort changer ». Et j'ai, j'ai jamais eu aucun problème au niveau social. J'ai continué le restaurant. Je continue à, à sortir. Je continue à…(silence) enfin, je me suis pas sentie mise à l'écart à cause de, à cause de tout ça. Et quand je, quand je lisais beaucoup de témoignages sur Internet, c'était le cas par contre. Donc, parfois, je me dis : est-ce que j'ai simplement de la chance ? Est-ce que… voilà. Peut-être."

- Relation with alcohol: Because alcohol has another impact after bariatric surgery, it is not always easy for patients to explain their difficulty to drink alcohol. As for food, some patients develop strategies to continue drinking alcohol but less quantity during their social activities.

« Dus dan.. en ook het alcoholmisbruik euh ik heb dat ook al van een paar mensen gehoord die allé in mijn dichte omgeving die als ge zelf al zo -zeg maar- een neiging tot extremen en verslaving hebt en ge gaat dan met een bypass euh allé het effect van alcohol is compleet anders hé want eh ik ben student geweest, ik kon vrij goed alcohol verdragen, ook omdat ge heel veel beweegt natuurlijk en als ge dan euh zeg maar zo sterke drank of een sterker bier ofzo pakt, ja het effect van wat dat heel snel wordt opgenomen in bloed en terug weggaat dat dat voelde direct euh en ik ken een paar mensen die die, echt niet zo, echt niet verslaafd zijn -ik kan dat niet inschatten omdat ik die mensen niet veel zie- maar ge hoort heel veel zeggen van; die is toch al considerably meer aan het drinken dan normaal [Lacht]. Dus dat moeten ze echt wel meegeven, denk ik, allé, ze doen dat ook hé. »

"Vroeger euh, ik dronk graag een glaasje wijn, ik dronk graag een Karmeliet, mijn Trippel enzo. Dat heb ik een jaar zeker niet gekunnen. Maar dan zonder je jezelf af zonder dat je dat weet. Je wil niet meer meegaan omdat je toch niet mee kunt drinken. En nu heb ik de gulden middenweg gevonden, een halve. Dat is mijn maatje, en als ik met iemand op een terras ga zitten, dan vraag ik bij iedereen of dat, allé ook een Karmeliet drinkt en dan de rest van mijn halve. Meer als een halve drink ik niet. Een halve verdraag ik. Ook één glaasje wijn per dag. Ofwel wit ofwel een rood, maar mijn glaasje wijn, en ik kook mijn groentjes en ik probeer gezond te leven en verse groentjes en wat weet ik."

3.1.6.12 *Clues (as mentioned by the patients) for potential improvement of the post-operative pathway*

(Nurse) coordinator

Some patients report to have missed a (nurse) coordinator in the team. While a nurse was available during the pre-surgery phase this was not the case postoperatively. Some patients say that the step to talk with them about problems and private issues is lower compared with a dietician, psychologist, etc. They consider a nurse as someone that can provide continuity of care and with whom they can have relationship of trust. Patients also report that they have a need to be able to contact someone with small questions. Moreover, some patients stipulate that there is a need that someone actively 'chases' people that are not compliant with follow-up appointments.

Ja, of dat je ergens een punt hebt waar dat je naartoe kunt bellen als je vragen hebt. … iemand die je altijd te woord kan staan, kan helpen met problemen die je eventueel hebt. Dat zou misschien wel een oplossing zijn. Nu niet dat je 24 op 24 een callcentrum moet hebben om … Dat je toch ergens … Iedereen heeft over tijd, heeft overdag wel tijd om een telefoontje te doen dat je zegt van oh ik heb daar last mee. Als je weet dat je ergens terecht kunt en dat je de vraag kunt stellen…. Het probleem is als je dan altijd naar de arts zelf moet bellen dan ja die zijn ook altijd bezig of die staan in het operatiekwartier of die kunnen niet gestoord worden.

Multidisciplinary team available on one place

Patients appreciate it when a multidisciplinary team is available on one place. This is not only convenient (e.g. to combine consultations), patients also report that this contributes to the communication and collaboration between disciplines and the level of standardization of the care process.

Mais non, je me suis sentie vraiment bien entourée, moi. Je pense que c'est le propre aussi des hôpitaux universitaires, c'est d'avoir des services. C'est un service de chirurgie bariatrique avec tout dedans.L'endocrino. C'est le service et tout le monde travaille ensemble, tout le monde se connaît. Mais c'est bien, enfin, parce que quand j'entends donc d'autres personnes qui l'ont fait ailleurs ou quoi, etc., c'est limite si les gens doivent pas trouver eux-mêmes leur diététicienne. Ah, il faudrait que j'aille chez un endocrino, heu…, je vais aller chez qui ? L'équipe était là et, et mon endocrino que j'avais déjà pour mon diabète en faisait partie. Donc, ça aussi, ça a poussé.

Out-of-hours accessibility in face to face or by phone/e-mail

It is also important that the follow-up appointments (which can be very time demanding) can be combined with work.

want die psycholoog die start al om 20 na acht, dus 'k vind dat geweldig. Dan ga ik... kom 'k ik gewoon ietske later op 't werk. Want als ge d'r allemaal zo verlof voor moet pakken…Allé, ze hebben daar ook wel oor voor dat da… Ze proberen dat ook voor hun patiënten zo na 8 uur verschuiven. …

Team availability by phone or e-mail is also a way to reassure patients and to strengthen their confidence (even if he/she does not dare to use this option).

Je sais que je peux les contacter à tout moment pour quelle question que ce soit. Je ne l'ai jamais fait, mais je sais qu'ils sont là. On me l'a déjà dit à la Citadelle, à l'hôpital : « S'il y a la moindre question, si vous ne vous sentez pas bien, vous nous téléphonez. » Le chirurgien, la diététicienne, je sais qu'ils sont là. C'est vraiment un soutien, on n'est pas là lâché dans le vide comme ça. Ça, pour moi, c'est important, même si je ne l'ai jamais fait, je n'ai jamais osé.

Delicate balance between monitoring and autonomy

Some patients mentioned a need of close and compulsory monitoring and coaching, mainly during the first (two) year(s) after surgery in order to achieve and maintain the required behavioural changes. But after a while, autonomy is requested.

ik denk dat ze die dat ze zeker het traject van de eerste 2 jaar dat de dat de afspraken allé misschien als ge ziet dat de persoon het niet doet, dat het vanuit de zorgkant moet komen en niet vanuit de patiëntkant. dat moet je zeker -denk ik- doen want, na die 6 weken gaat iedereen naartoe, omdat ge gewoon allé die afspraak ligt al vast en ge moet er naartoe gaan, maar die van de 6 maanden en van één en van eerste jaar en dan jaarlijks daarna, denk ik, euhm, dat dat die eerste 3 afspraken dat dat echt vanuit vanuit de zorgkant verplicht moet gedaan worden, in de zin van allé dat ze u bellen en verplichten om te komen, euhm. Dus euh, dat is wel -denk ik- belangrijk.

Commitment in follow-up… before intervention

Some patients mentioned they had been suggested to commit in the follow-up, before surgery. It is not a real contract that has to be signed but it is presented this way which result in a kind of commitment motivating them.

« euh de nazorg is euh wordt heel goed op voorhand besproken, dus eigenlijk stapte in een tweejarig traject- dat zeggen ze eigenlijk van op voorhand, euh waarbij dat ge afwisselend den arts, de diëtiste, de psychologe en de bewegingsdeskundige ziet, euh ge gaat eigenlijk een engagement aan, eh dus ge... ik weet nu niet da'k letterlijk mijn handtekening heb moeten zetten, maar zo spreken zij wel."

Coaching

Some patients emphasised that coaching with practical organisational help can be useful. It concerns shopping for food, cooking, sport, dressing, make-up…

Je pense que ça, ça serait vraiment utile et ça, d'ailleurs, c'est ce qui m'aurait manqué quoi, d'avoir quelqu'un qui m'oriente plus dans des petits plats à faire et qui m'aide dans la gestion du grignotage, la gestion du stress, la gestion…

Enfin, s'habiller, comment se mettre en valeur, enfin… Non, mon parcours, c'est tout à fait différent. Moi, j'ai fait les « Reines du Shopping ». Je me suis retrouvée là et là, ça m'a fait le plus grand bien. Ça m'a vraiment fait un bien fou de me retrouver là et de savoir comment faire, ce que je pouvais mettre, ce que je ne pouvais pas mettre, et d'avoir des conseils après.

Peut-être un coach qui apprendrait à gérer autant l'organisation au niveau des courses, des repas, et la gestion sportive ! Donc, un coach en général. De voir à ce que la vie qu'on entreprend soit saine en son ensemble. Parce que, je pense qu'on vise... bon, le diététicien s'occupe de la nourriture, mais à côté de ça, si on gère pas la façon de gérer le quotidien ou le sport qui va avec, on n'arrive pas au bout.

However, current coaching is often expensive. Patients can sometimes not continue because of the financial limitation.

Et financièrement je n'ai pas pu tenir. J'ai dû déménager, j'ai dû... Et donc voilà. Donc j'espère un jour pouvoir revenir à ce genre de système…

Group sessions to meet with peers and to receive practical tips

Some patients suggested to organise group sessions on practical tips such food workshop.

Vraiment des cours sur l'alimentation, mais pas de la diététique classique et rébarbative. Mais plutôt des ateliers. […] Ouais, des ateliers culinaires où on goutte des saveurs de produits bruts, de trucs plus simples, de trucs plus sains.

le gastro-club c'est une super initiative. Il y a un grand souper annuel où on rencontre 500 personnes opérées.

Financial support

A financial support is mentioned by the patients in several domains such as psychological or dietician consultation, sport access, vitamin supplementation. An important point of concern is the financial impact of aesthetic surgery.

Peut-être, oui la prise en charge financière des consultations psy, pour qu'elles deviennent peut-être plus accessibles à certains.

3.2 A qualitative analysis of Healthcare professionals views

3.2.1 Objective

This section focuses on the organization and functioning of the care (before) and after bariatric surgery as experienced by physicians and other healthcare providers. The objective is to identify, from their perspective, the problems, difficulties and needs that are hampering the proper functioning of the care pathway. The focus lays on the follow-up after discharge of adult patients. Hence, the period of hospitalization itself falls outside the scope of the study. We are thus particularly interested in the following research question: "According to your professional vision, which are the best-practices, problems and unmet needs in the care pathway of bariatric surgery as experienced by healthcare professionals?"

3.2.2 Methods

To answer the research question, we used the nominal group technique. In total, 4 nominal groups (2 for each language group of French and Dutch) were organized with physicians and other healthcare providers. Scheduled to last 2 hours, they took place in September 2018.

"The nominal group technique (NGT) is a method of consensus research in qualitative research divided into several phases. In a first step, the participants of a group provide a personal formal written answer to a question drawn up by the research team. They are instructed to formulate a maximum number of proposals in response to the question, original or not, in a concise and precise manner. The proposals are then collected and numbered by the facilitator who writes them on a board so that the group can read them. The second step is a clarification phase. This allows everyone to nuance their opinions and solutions, make the necessary changes and understand the details of the proposals. Some proposals are merged, others are reformulated. When everything is clear, participants are invited to vote in writing for the five proposals that seem most important to them, with one to five points (five points for the most important proposal). The session ends with the counting of the points and the presentation of the solutions most promoted by the group. "[i]

In this study, the intention was to combine the nominal group with a deeper discussion, such as in a focus group.

The participants were recruited by mail and/or phone from a list of healthcare professionals provided by the KCE[j]. All groups took place at the KCE premises in Brussels. We opted for a combination of open and in-depth questions. Specifically, we formulated three open questions for which, if necessary, more in-depth questions could be asked:

1. *Challenges*: What problems, shortages and needs do the participants identify in the current organization and functioning of the care pathway?
2. *Solutions*: How can these challenges be tackled? What are good practices?
3. *Priorities*: Which actions should be prioritized in order to improve the quality of care? What are the obstacles to these priority actions?

After each question, participants wrote down their answers independently (brief phrases or statement on post-it, one idea per post-it). The answers were listed by the moderator on a flip chart visible to everyone, before being discussed.

Three overarching themes were also addressed in the groups:

1. Links and role of the primary care regarding follow-up

[i] Laurent Letrilliart, Marc Vanmeerbeek, À la recherche du consensus: quelle méthode utiliser ?, **Exercer 2011;99:170-7.**

[j] The KCE identified potential candidates via searching professional organisations (e.g. BESOMS; BBAHS), experts participating in the KCE study (https://kce.fgov.be/en/study-program/study-2017-05-hta-indications-for-bariatric-surgery). A mix between high-medium and low volume centres was envisaged.

2. Concentration of expertise: need for reference centres for all bariatric surgery patients or with a focus on a part of the population - e.g. more difficult cases
3. Empowerment of patients: how to give more responsibility to patients, including examples from abroad

When these themes were not covered during the discussion, the moderator could guide the participants with more in-depth questions towards these topics.

The participants received no preparatory documents before the discussion; the 'nominal group' was held at the start of the study with the idea to get input about the shortcomings of the current system and first ideas about solution elements. Conducting the nominal groups with input from the literature is another approach which would have had several advantages: 'more concrete' propositions; counter-balance the arguments of the interviewed experts with the available evidence, etc. On the other hand it has the disadvantage that 'out-of-the-box' thinking could have been limited. Moreover, the nominal groups were one of the building blocks to be used (with literature review, international comparison, etc.) to elaborate the final recommendations, which were also discussed (and refined) with experts/stakeholders.

One moderator oversaw the Dutch-speaking groups, and another took charge of the French-speaking groups. A reporter-analyst was present to observe and take notes during the meetings. The group discussions were recorded, with the consent of the participants. Immediately after each discussion, the moderator and reporter debriefed the discussion and discussed the main topics considered by the participants. Afterwards, all discussions were summarized by the reporter, but no integral transcriptions were made. In a first step, each group discussion was analysed. Following this, a transversal analysis was performed based on the discussions during the meetings.

The analysis aimed to answer the research question and points out general similarities and differences between professional (physicians and other healthcare providers) and/or language groups.

3.2.3 Description of the nominal groups

Four nominal groups took place, gathering a total of 29 healthcare professionals (16 French-speaking and 13 Dutch-speaking) representing 7 professions from 16 different institutions.

The nominal groups all took place in a very pleasant and respectful atmosphere, allowing each participant to express themselves without difficulty. The presence of an observer (KCE researcher) did not seem to interfere with the groups' dynamic.

There were also some limitations to the composition of the nominal groups. Despite recruitment efforts, some professionals were not (e.g. physiotherapists) or very little (GPs) represented. The recruited professionals were all involved with bariatric surgery, and/or with patients who had this type of intervention. It would have been interesting to hear the point of view of professionals with no interest or knowledge on the subject.

The choice for the nominal group technique is another source of limitations. The most important part of the discussions was focused on discussing the problems and the solutions. When trying to identify priorities, the numerical priority scoring wasn't effective in some groups where the discussions raised so much enthusiasm that it was difficult to get participants to vote to prioritize the identified solutions.

Table 8 – NGT with healthcare professionals

	H-FR	P-FR	H-DU	P-DU
Language	French	French	Dutch	Dutch
Participants	Healthcare providers	Physicians	Healthcare providers	Physicians
Date	12/09/18	12/09/18	18/09/18	18/09/18
Time	14-16	19-21	14-16	19-21
Place	KCE	KCE	KCE	KCE
Number	5	11	6	7

The two nominal groups with healthcare providers took place in the afternoon, and gathered a total of 11 participants, all female except for one psychologist:

Table 9 – Profile of healthcare providers

Healthcare providers	H-FR	H-DU	Total
Coordinator (nurse) (C)	2	1	3
Dietician (D)	2	3	5
Psychologist (P)	1	2	3
Total	5	6	11

The nominal groups with physicians took place in the evening. These groups counted 3 female and 15 male participants:

Table 10 – Profile of the physicians

Physicians	P-FR	P-DU	Total
Bariatric surgeon (BS)	7	5	12
Endocrinologist (E)	1	1	2
General practitioner (GP)	1	1	2
Internal medicine (IM)	2	-	2
Total	11	7	18

3.2.4 Results

3.2.4.1 Challenges

The discussions in the four nominal groups centre on ten challenges. The identified challenges concern the pre and post-operative stages of the care pathway and are often transversal. The table below illustrates the challenges debated by the participants in the nominal groups.

Table 11 – Overview of challenges identified by participants

Core challenges	H-FR	P-FR	H-DU	P-DU
1. Need for a more effective preoperative phase	X	X		
2. Misinformation of patients	X	X		
3. Motivation of patients and adaption of their lifestyle	X	X	X	X
4. Long term follow-up of patients	X		X	
5. Need for a defined postoperative care pathway	X	X	X	X
6. Involving primary care providers and multidisciplinary collaboration	X	X	X	X
7. Reimbursement of consultations and medicines	X	X	X	X
8. Need for a coordinator		X	X	X
9. Need for a central register	X	X	X	X
10. Alternative surgeries		X		

In what follows, we provide an outline for each of these challenges.

1. Need for a more effective preoperative phase

Both French-speaking groups (H-FR, P-FR) indicate that the objectives of the preoperative stage should be adapted.

Despite its mandatory nature, the preoperative phase seems insufficient to educate the patient on the importance of the necessary follow-up and

upcoming lifestyle changes. An important shortcoming in the legal criteria is, according to several participants, the fact that the advice of a dietician is not a legal requirement while their input is very valuable. The input from other healthcare professionals could also be increased (without making them compulsory). An example is to foresee a consult with an anaesthetist for the very super-obese patients. Currently the input from GP's is very limited. Some centres send by default a letter to the GP with an invitation for the MD meeting. This could be regarded as a best-practice. GP's will not have the time (in most cases) to attend this meeting but for very complicated and delicate cases they will maybe make an exception. After all they are well informed about the patients' medical history and his context (e.g. family relationships)

Many patients also see the preoperative stage as the entry gate for bariatric surgery. They lend themselves to the game of appointments, especially with the psychologist/psychiatrist (and/or dietician) whose approval is essential to access the operation. According to the participants, some patients even tend to be manipulative and follow the tips and tricks they learned from other patients, or even professionals. Therefore, according to some surgeons, this phase should also pursue the objective of triggering patient engagement and should turn the patient into an actor responsible for his/her own progress. As a coordinator states it, this mind switch in patients requires a sufficiently long period of time. A surgeon who operates too quickly (a practice reported by several participants) prevents this and reinforces the process of patients' passivity. Such behaviour in surgeons can be explained by existing competition, as it is very easy for patients ("shopping behaviour") to find another surgeon ready to operate more rapidly.

2. Misinformation of patients

According to the participants of H-FR and P-FR, patients receive a lot of information before the surgery, but they tend to forget it. Patients also look for information on internet forums or turn to "Doctor Google", where they are at risk of getting false and sometimes dangerous information on which they build false expectations. Surgeons express that despite the information given, the patient is not necessarily aware that the operation is not an easy miraculous solution. Additionally, patients often lack knowledge on the necessity of supplements and the importance of physical activities. Finally, some patients are also unaware of certain financial issues (e.g. the cost associated with the need for vitamins or supplements), such as due payment of consultations in the postoperative stage, and non-systematic reimbursement of reconstructive surgery.

3. Motivation of patients and adaption of their lifestyle

This challenge was identified by all four nominal groups. The participants consider motivation of patients to be a major issue, despite recent efforts of obesity centres and hospitals to ensure lifestyle changes in patients - such as group meetings, free or paid thematic workshops on psychology or dietetics, planning of follow-up appointments, sending of invitations/reminders. Motivation is an important factor in realising behavioural change in patients. This essential behavioural change should be encouraged starting from the preoperative stage, because it helps, according to the participants, to ensure an increased quality of life, less negative side-effects and a more positive attitude to life in general. This requires (time for) empathy from professionals during the follow-up, and for them to really listen to and understand patients. A coordinator can play an important role in this regard, although patients also must be able to (to be given means to) find their way to psychologists when necessary.

The participants identify several reasons for a lack of motivation in patients:

- A significant weight loss during the first month leads many patients to underestimate the importance of post-operative follow-up. After a few missed appointments, or in case of difficulties, a "return" to the post-operative care pathway becomes difficult.
- Bariatric surgery is demand-driven care. Patients ask to be operated in order to lose weight. They all too often see surgery as a "quick fix solution" and are often insufficiently aware of the lifelong impact these surgeries have and the behavioural change that is required.
- Some patients choose the easy way and do not go to consultations unless problems arise. They do not realise/know, however, that post-operative care could also prevent those problems from arising in the first place.

- The bariatric care pathway is a long-term care pathway and often not the only care pathway patients are going through (sleep research, cardiology, diabetes). Consequently, patients do not always have the required energy and resources to invest in their bariatric care.
- Consultations with psychologists and dieticians are not reimbursed.

As postoperative monitoring is essential to ensure good results, a lack of motivation in patients is not without consequences:

- Patients are at risk for addictions (alcohol, drugs), of becoming depressed, and of re-gaining weight (which some patients attribute to a surgical failure) causing the need for re-interventions.
- Patients do not take their vitamins nor supplements potentially causing nutritional deficiencies.
- Problems related to contraception can arise.
- There is a failure to implement physical rehabilitation work to preserve muscle mass.

4. Long term follow-up of patients

The participants describe obesity as a chronic disease where a long-term follow-up is necessary to allow the patients to reflect, to understand how their obesity was built and to find ways to handle it. The healthcare providers (H-FR and H-DU) indicate it is very difficult to follow-up patients on the long term for various reasons, which are often linked to the previous challenge of motivation in patients:

- There are no incentives for patients to stay in the post-operative care pathway. This should be addressed in a stricter way, but without scaring patients away. A positive approach is needed, such as stimulating healthy physical activity.
- Patients consider themselves “cured” after the operation and only return when problems arise (e.g. weight regain or complications). Some patients also ask for an operation because of aesthetic reasons and not because of health reasons. They are looking for an easier way to lose weight compared to long term dieting.
- There seems to be insufficient capacity to provide all patients with post-operative care. With the number of patients also the need for specialists increases. Therefore, involving primary care providers becomes even more important.
- The financial cost of psychological care is for many patients a threshold to consult a psychologist. Psychologists insist that the important physical and mental changes patients go through after bariatric surgery require a professional follow-up and help to avoid problems such as idealization of results, loss of reference points, self-image, conjugal and family issues, etc. Yet, healthcare providers find that patients often prefer going to a dietician to discuss emotional issues, because this is cheaper.
- There is still taboo about consulting a psychologist. Especially in case of problems after the “honeymoon phase” (the first year after the surgery). This taboo and the shame surrounding it, often drives patients to go to a different hospital or centre, where they are not aware of the patient’s history.

5. Need for a defined post-operative care pathway with criteria

The participants of the four nominal groups agree that no clear post-operative care pathway has been defined today. This issue pertains to both organizational and financial aspects. This gives rise to several challenges (which are often linked to other core challenges):

- Without a well-defined and standardized care pathway, the identification of problems in patients is more difficult and hinders a focus on prevention.
- There is a lack of collaboration between bariatric surgery centres, and between primary care.
- There are many differences between post-operative cares depending on the bariatric surgery centre. Furthermore, different physicians tend

to interpret problems in a different way, which makes a more coherent approach necessary.

- When surgeons are only paid to do surgeries, they could be inclined to only operate on low-risk patients to prevent complications, post-operative care and re-interventions.
- Current post-operative care pathways do not foresee enough consultations with psychologists, dieticians and physiotherapists. The post-operative follow-up all too often focuses primarily on the medical-somatic aspects.
- There is a need for more personalised approaches. For instance, patients with post-operative weight regain due to eating disorders need a different type of approach compared to patients with medical complications.

6. Involving primary care providers and multidisciplinary collaboration

The participants from the four nominal groups state that the involvement of primary care providers (dieticians, GPs, physiotherapists, nurses) can help to improve the follow-up. Moreover, there is a need for more collaboration between different disciplines in the (pre-) and post-operative care pathway. For instance, endocrinologists, physiotherapists, psychologists and dieticians should work together, including both primary and secondary care providers. Especially because patients tend to trust their GP over secondary care providers and prefer community care. Additionally, in case of rapid discharge from the hospital after the surgery, follow-up at the patient's home is necessary. There are, however, some challenges that need to be tackled to do enable collaboration:

- The combination of time constraints and the increasing inflow of patients, however, make it impossible for physicians to organise multidisciplinary meetings for each patient. Involving the GP (especially when physical presence is required) is a challenging endeavour.
- Primary care providers often lack specialized knowledge and expertise regarding obesity and bariatric surgery. This implies they cannot give grounded advice on post-operative care, medication, combinations of medication and complications.
- Not all primary care providers refer patients correctly. Some will encourage patients to seek out specialized care, whereas others will hold them back and postpone referrals.
- Hospitals and GPs should collaborate in the post-operative care pathway to ensure that when complications or issues arise, patients can be easily referred to the specialized care of the hospitals.
- Primary care providers should be trained to correctly refer patients to specialized care providers when necessary.
- There is no incentive for primary care providers to learn about obesity and bariatric surgery. Similar to the diabetes care trajectories, primary care providers should be compensated for taking part in trainings or for managing the care of these patients.

7. Reimbursement of consultations and medication

Within all four nominal groups, participants point out that post-operative care after bariatric surgery is usually not sufficiently reimbursed, except for consultations with physicians, physiotherapists and certain medication. The participants indicate that by not offering any reimbursement for post-operative follow-up by a psychologist and dietician, patients are given the impression that this type of post-operative care is not important. Further, they consider financial constraints to be an important reason for why some patients exit the postoperative care pathway. Adding to this issue, are the differences in reimbursement of postoperative care between different sickness funds. Some examples of financial thresholds for patients:

- Vitamins are not reimbursed, making it less likely for patients to keep taking them.
- Some patients suffering from hypoglycaemia do not have access to self-monitoring equipment.
- Private consultations with dieticians are more expensive and not reimbursed, increasing the thresholds for patients who need their care.

- The cost of reconstructive surgery is high. Yet, most of the interventions are regarded as 'plastic surgery' instead of 'reconstructive surgery' and are therefore not reimbursed.
- According to the French-speaking groups, a global underfunding of bariatric surgery within the entire country and on all levels is the root cause of these thresholds. Moreover, because of underfunding, money is also scarce when it comes to hiring staff, to purchasing appropriate equipment and to equipping dedicated rooms.

8. Need for a coordinator

Both healthcare providers and physicians (P-FR, H-DU and P-DU) specify the need for a coordinator who guides and supports patients throughout the entire care pathway and who answers their questions. Ideally, according to the participants, a coordinator oversees three major tasks:

- to support patients in contacting physicians and other healthcare professionals and finding the right care pathway;
- to perform administrative tasks in support of the care pathway (e.g. making appointments; monitor follow-up, contact patient who do not show up on a consultation, and updating databases with patient information); and
- to act as a bridge between patients, primary and secondary care providers.

Currently, each bariatric surgery centre can decide independently whether to appoint a coordinator. There is no funding for this role (some hospitals use deductions from the physician fees to finance this role) and hospitals therefore often organise post-operative care without having a coordinator assigned. When there is no coordinator appointed, the job of coordinator is given to nurses or dieticians as an additional task. Several challenges are identified regarding the need for a coordinator:

- The job of coordinator requires a full-time position.
- A coordinator needs to have access to the required resources and should be given adequate time to follow-up patients.
- Financial resources are required to hire a coordinator and to enable them to do their job.
- There is no job description available that describes the job of coordinator (e.g. tasks, required knowledge and expertise and involvement in the care pathway).
- It is currently very difficult for coordinators to find suitable training. The coordinator is preferably someone with medical knowledge (e.g. a nurse or dietician), coordinating expertise (e.g. coordinating post-operative follow-up and register follow-up).

9. Lack of a central registry

The participants of all nominal groups identify the lack of a central registry as a challenge for several reasons:

- When patients see a new physician or go to a new bariatric surgery centre, the patient's history is not accessible.
- It is impossible to identify patients who shop around between physicians or hospitals to receive their desired treatment.
- When physicians are unaware that a patient has received different advices elsewhere, the patients might lose their trust in the advice they receive. Without a register, there is no way to keep track of this "shopping behaviour".
- There are no good data on a national level to monitor the quality of care of the care pathway, nor to do research;

A central register would gather patient information from primary and secondary care providers and make it accessible for treating patients. The creation of a central register might be difficult due to GDPR and privacy rules. Especially, since it would also be interesting to use the valuable information in such a central register for research, identifying best practices and benchmarking between institutions. The initiatives that were taken (and launched by the scientific and professional organisations) in the past failed. The prerequisites for a successful implementation such as a data manager,

follow-up (long-term) capacity for analysis; audit and control were lacking or not? sufficient because those initiatives were non-funded initiatives

10. Alternative surgeries and differentiation between patient groups

The participants of P-FR point out that patients who have been refused bariatric surgery, might turn to alternative surgeries such as endoscopic (gastroscopic) plication. This operation is designed to make patients lose weight but is not included in the law of reimbursement for bariatric surgery. According to the participants, this operation should be avoided as the outcome is often not as good. Moreover, patients with complications often return to bariatric surgery centres.

Additionally, the participants stress that bariatric surgery patients with (e.g. diabetes patients who require intensive follow-up by endocrinologist) and without co-morbidities might require another approach.

3.2.4.2 Solutions

The participants of the four nominal groups discussed a diverse set of solutions. Overall, we distinguish five categories (see the table below):

- policy measures (protocol, quality label, budget);
- motivational measures (incentives);
- educational measures (providing information or training);
- organizational measures (reorganize postoperative care, new roles and collaborations); and
- technological measures (IT support and apps).

These categories are not mutually exclusive and solutions can often be placed under more than one category. Similarly, some solutions address more than one challenge. Additionally, in defining the categories and assigning solutions to each category, we aimed to stay as close as possible to the accounts of the participants. This explains why the nature of the categories we distinguish differs.

Two solutions emerge from the discussions which pertain to many challenges: refund consultations, and the development of a standardised care pathway.

The measure of **refunding consultations** is identified as a solution for improving the effectiveness of the preoperative phase, to motivate patients, to improve the long-term follow-up of patients and to address the lack of current reimbursements. Refunding consultations is pointed out as a policy measure. Budget should be provided for reimbursing consultations with dieticians and psychologists when these are part of the pre- or postoperative care pathway. In addition, the participants are also in favour of using financial incentives (e.g. reduced co-payment) to motivate patients to follow through with their pre- and postoperative care pathways. These financial incentives can be linked to criteria such as attending follow-up appointments. Another example are pre-purchased care packs. Patients are required to buy a pack of pre- and postoperative care consultations (including the consultations with dieticians and psychologists which are not reimbursed) prior to being operated.

Next, **standardisation of the care pathway** is considered as a solution to improve the effectiveness of the preoperative phase, to improve the long-term follow-up of patients, to obtain a uniform care pathway and reduce inappropriate variation in practice, to ensure multidisciplinary collaboration and to realise reimbursement of consultations and medication.

Standardisation is both a policy and an organisational measure, as it pertains to a legal framework and its realisation in practice. According to the participants, a standardised care pathway defines the following aspects:

- How to motivate patients.
- Criteria for inclusion of patients in a bariatric care pathway.
- Criteria to assess and guide patients (e.g. physical fitness, incentives).
- A protocol for postoperative care which determines the required care and involved care providers.
- Information sessions and incentives to attend these sessions for all involved healthcare professionals.

- Conventions that coordinate the collaboration and referral of patients between the coordinator, psychologist, dietician, surgeon, endocrinologist and GPs.
- Reimbursement of consultations and medications.

The participants are also convinced that a standardised care pathway should include a protocol or convention, certain quality standards for hospitals, centres and physicians, and accreditation of dieticians, psychologists or other (e.g. physiotherapists).

Table 12 – Overview of the solutions identified by participants

Policy measures	Motivational measures	Educational measures	Organisational measures	Technological measures
1. Need for a more effective preoperative phase				
• Refund consultations (H-FR, P-FR) • Centres of excellence (H-FR, P-FR) • Standardised preoperative phase (H-FR)	• Follow-up contract (H-FR, P-FR) • Group sessions (H-FR, P-FR)	• Educational sessions (H-FR)	• Assign coordinator (H-FR) • Standardised preoperative phase (H-FR)	
2. Misinformation of patients				
	• Group sessions (H-FR, P-FR)	• Educational sessions (H-FR)		• Forum for patients (P-FR)
3. Motivation of patients and adaption of their lifestyle				
• Reimburse consultations (H-FR,P-DU, P-FR)	• Reimburse consultations (H-FR, P-DU, P-FR) • Financial incentives for the patients' in case of adherence (P-DU, H-FR) • Pre-purchased care pack (P-DU) • Automated reminders (P-DU) • Positive incentives (P-DU) • Group sessions (H-FR, H-DU)	• Educational sessions (H-FR)		• Automated reminders (P-DU) • IT support follow-up (P-DU) • Apps for patients (P-DU)

Policy measures	Motivational measures	Educational measures	Organisational measures	Technological measures
4. Long term follow-up of patients				
• Standardised postoperative care protocol (H-DU, P-DU, H-PR, P-FR) • Quality criteria for postoperative care (H-DU, H-FR) • Refund consultations (H-DU, H-FR)	• Reimbursement of consultations (H-DU, H-FR)		• Standardised postoperative care protocol (H-DU, P-DU, H-PR, P-FR) • to involve the GP in the follow-up, and pre-op phase	• Apps for patients (H-DU)
5. Need for a defined postoperative care pathway				
• Standardised postoperative care protocol (H-DU, P-DU, H-PR, P-FR) • Quality criteria for postoperative care (H-DU, H-FR) • Accrediting paramedics (H-FR, P-FR, P-DU)		• Accrediting non-medical staff such as dieticians and psychologists (H-FR, P-FR, -DU)	• Define the role of coordinator (H-DU, H-FR, P-DU, P-FR) • Multidisciplinary collaboration (H-DU, H-FR, P-FR) • Standardised postoperative care protocol (H-DU, P-DU, H-PR)	
6. Involving primary care providers and multidisciplinary collaboration				
• Standardised postoperative care protocol (H-DU, P-DU, H-PR, P-FR) • Accrediting non-medical staff such as dieticians and psychologists (H-FR, P-FR,P-DU)	• Incentives for primary care providers to educate themselves (P-DU)	• Educating primary care providers on obesity (H-DU, H-FR, P-FR)	• Standardised postoperative care protocol (H-DU, P-DU, H-PR, P-FR) • Involvement of GPs, physiotherapists and dieticians (H-FR) • Collaboration with primary care providers, tertiary centres and periphery (H-DU, H-PR) • Referral to and from GPs (P-DU, H-FR, P-FR)	• Quick detection tools (H-DU, P-DU)
7. Reimbursement of consultations and medicine				

Policy measures	Motivational measures	Educational measures	Organisational measures	Technological measures
• Reimbursement of consultations (H-FR, P-FR, H-DU, P-DU) • Standardised postoperative care protocol (H-DU, P-DU, H-FR, P-FR) • Mind switch of policy actors (P-DU, P-FR)				
8. Need for a coordinator				
			• Define the role of coordinator (H-DU, H-FR, P-DU, P-FR) • Assign coordinator (H-DU, H-FR)	
9. Need for a central register				
• Create a central register (P-DU, H-FR, P-FR)				
10. Alternatives surgeries				
• Legislate and differentiate bariatric surgery from alternative surgeries such as endoscopic (gastroscopic) plication (P-FR)				

Below we provide a brief overview of the identified solutions per category.

1. Policy measures:

- Standardisation: the design of a protocol for pre- and postoperative care that determines amongst other things the criteria for patients and care, which physician and healthcare professionals need to be involved and the overall duration of the care pathway.
- Centres of excellence: development of a legalised framework for specialised centres in which bariatric care is provided and in which specialised, trained and dedicated paramedics collaborate; setting thresholds for re-interventions and borderline cases. The participants acknowledged that despite the need for such centres it is hard to define criteria that are well accepted and they are also afraid that it will be implemented as a cost-containment measure.
- Reimbursed consultations: there is a need for budget to refund consultations in the pre- and postoperative care pathways, as well as specific medication.
- Quality criteria: criteria need to be determined that assess the availability of hospitals and centres to offer long term postoperative care.
- Accrediting dieticians, psychologists and physiotherapists: accrediting these healthcare professionals will ensure that primary and secondary care providers are qualified to manage bariatric patients.
- Create a central register: development of a central register in which primary and secondary care providers can access and log patient information regardless of hospital or region. Such a register can be used for monitoring and benchmarking quality of care and for research purposes.
- Legislate and differentiate bariatric surgery from *alternative surgeries such as endoscopic (gastroscopic) plication:* the difference between these two types of surgeries should be legally defined to better prevent complications in patients.
- Mind switch of policy actors: policy should move from a focus on saving money to a focus on good health care which is financially feasible.

2. Motivational measures:

- Follow-up contract: patients can be asked to sign a contract in which the modalities of the care pathway are specified and in which the patients commit themselves to follow the specified care pathway.
- Group sessions: group sessions are very motivating to patients and allow them to offer support and motivation to one another. Patients involved in those groups return more often for consultations with paramedics and can offer support and motivation to one another.
- Reimbursement of consultations: by reimbursement of consultations the threshold for seeking out professional help is lowered. Moreover, financial incentives for compliant patients or pre-purchased care packs might help to motivate patients to follow through with their care pathway.
- Automated reminders: by using automated reminders for consultations, attendance to consultations can be increased.
- Positive incentives: by using positive incentives to trigger patients (instead of rebukes) patients can be motivated to follow through the care pathway.
- Incentives for primary care providers to educate themselves: by offering primary care providers incentives to educate themselves, they are stimulated to update their knowledge and expertise on obesity, bariatric surgery and postoperative care.

3. Educational measures:

- Educational sessions: patients should be educated about nutrition, exercise and lifelong behavioural changes and adaptions.
- Accrediting dieticians, psychologists and physiotherapists: these healthcare professionals need to be educated, tested and accredited to ensure they have the necessary knowledge.

- Educating primary care providers on obesity and bariatric surgery: GPs, dieticians, physiotherapists and psychologists need to be educated on obesity and bariatric surgery.

4. Organisational measures:

- Standardisation: when a standardised care pathway is defined, the organisation of bariatric care needs to be organised accordingly with new roles and new collaborations.
- Coordinator: the function of coordinator needs to be described and subsequently coordinators can be appointed and trained. Coordinators can provide support for both patients and physicians.
- Involvement of GPs, physiotherapists and dieticians: patients could seek help from specialised primary and secondary peripheral care provider when issues occur, instead of seeking out their surgeon.
- Collaboration with primary care providers, tertiary centres and periphery: structural collaborations needs to be built between these parties to improve the provided health care and referral.
- Referral to and from GPs: patients could be referred to their GP for follow-up and GPs could refer patients to specialised healthcare professionals when necessary.

5. Technological measures:

- Forum for patients: an official forum which is managed and moderated by specialists in bariatric surgery could help to prevent misinformation.
- Automated reminders: an IT-system that would allow physicians to send out automated reminders for consultations to patients.
- IT support follow-up: and IT-system that would help physicians and other health care professionals to keep track of patients their progress and participation in the care pathway.
- Apps for patients: the development of apps to inform patients on bariatric care (e.g. dietary recommendations), remind them of consultations, follow-up on their progress and connect them to specialised healthcare professionals when necessary.
- Quick detection tools: tools that would allow primary and peripheral healthcare professionals to quickly detect issues in the pre- and postoperative stages and advice on referral to specialised care providers.

3.2.4.3 Priorities

After discussing the possible solutions, the participants were asked to identify the priority solutions as well as the barriers and opportunities. We find that there is little consensus between the four nominal groups on which solutions should be prioritised. The financial and legal aspects seem to be transversal thresholds on which the implementation of many of the proposed solutions depend.

The – Priorities established by nominal groups below presents the priorities established by the different nominal groups:

Table 13 – Priorities established by nominal groups

Solution	Votes	Barriers	Opportunities
Reimbursement of consultations (and bariatric surgery)	2 (H-FR) 6 (P-FR) 5 (H-DU)	• Legal barrier: some allied health professionals services such as dietetics are not legally recognized in the current path. • There is insufficient funding and it is unclear where the funding for reimbursements should come from. • Policy and minister	• The reimbursement of consultations of psychologists and dieticians could motivate patients to better compliance in the pre but also postoperative stages.
Standardised postoperative care protocol	3 (H-FR) 6 (P-DU)	• Financing. • There are more dedicated healthcare providers required to provide post-operative care. • A convention should be both standardized as well as offer individualised care pathways.	• Define the role of coordinator. • Introduce certain criteria for postoperative care. • Use existing conventions and protocols as inspiration or starting point (e.g. diabetes, OSAS). • It is a contract between physicians and hospitals. • Coordinate the collaboration and flow of patients between hospitals and GPs. • Transform the bariatric care process into a continuous flow which is in sync with other care pathways. • Include incentives to motivate patients and stimulate lifelong behavioural changes.
Define the role of coordinator	3 (H-DU) 4 (P-DU)	• Coordinators do not have access to trainings and there is no quality standard. • Coordinators now work using trial and error methods.	• Objective criteria. • Fair wages. • Offer longitudinal, radical care. • Include collaboration between primary and secondary care providers.
Care pathway	3 (H-FR) 3 (P-FR)		• Attention to the implementation of performance obligations. • Setting up a cell with a commission of experts for special situations.
Central registry	5 (P-FR)	• Finances. • Data safety.	• Easier access to patient information as gathered by primary and secondary care providers. • Interesting for research purposes and national or international benchmarking. • Motivate the patient through the data, e.g. through journey tracking. • Link with system for refunds.

Solution	Votes	Barriers	Opportunities
			• It is a security for both the patient and the physicians since there is a written record
Educating primary care providers on obesity	2 (H-FR) 3 (H-DU)	• GPs are already required to take a lot of trainings.	• The training should focus on the assessment of patients' eligibility for surgery. • Also relevant for paramedics (psychologists, dieticians, physiotherapists).
Collaboration with tertiary centres, periphery and GPs	4 (H-DU)	• Time and resources to enable collaboration. • Collaboration cannot be measured or expressed in returns by the management, and it does not yield immediate results.	• Apps could possibly help to bring care providers in contact with one another in an easy way.
Quick detection tool to identify if patients are eligible for surgery	4 (H-DU)	• Finances. • It must be prevented that GPs must pay to use the tool, that would be a threshold for using it.	• Digital tool or app.
Accrediting paramedics	4 (P-DU)		• Create and provide specific trainers for paramedics that are interested in bariatric (post-operative) care. • Educate primary care providers on obesity and bariatric care. • Quality label for bariatric care which goes beyond clinical interventions. • Clearly define the tasks for paramedics in primary and secondary care.
Adaptation of the legal framework to legally recognise all disciplines (dieticians)	3 (H-FR)		
Centres of excellence	2 (H-FR)	• Difficulty in defining labelling criteria	
Sports and revalidation	2 (P-DU)	• Previous negative experiences of patients with sports can hold them back from taking up fitness activities again	• Prevent weight regain. Healthy eating patterns without "moving" can also lead to obesity. • Physiotherapists are equally important as dieticians, and potentially even more influential for weight retainment.
Inform and educate patients	2 (P-DU)	• Information must be repeated to have a lifelong impact • Education of patients should be embedded in the care offered by primary care providers.	• Regular and social media promote wrong information. Hospitals and physicians should offer counterweight and put correct information out

Solution	Votes	Barriers	Opportunities
			there as well. The government should have a role in this too. • Communicate a uniform message to patients based on correct information.
Open registration system	2 (P-DU)	• A new registration system that involves primary and secondary care providers would require a cultural change. • Financing.	• Possible starting point is the GMD (Globaal Medisch Dossier) used by GPs
Incentives for primary care providers to educate themselves	2 (P-DU)		• Motivate GPs (and other paramedics) to be involved in post-operative care of bariatric patients and to update their knowledge and expertise on the matter.
Global funding of bariatric surgery must increase	1 (H-FR)		
Long term follow-up with collaboration between hospitals and GPs	1 (P-DU)		
Apps for patients	1 (P-DU)		• Involve GPs in app to connect with patients.
Centralised care	1 (P-DU)		

3.3 Key points

Patient interviews

- Decision for surgery
  - The decision follows after a long history of (failed) weight loss attempts and a difficult relationship with food. Most patients refer themselves towards surgery after consulting family/friends, the internet and social media.
  - The main reason for surgery is the 'weight loss'. In addition, patients want to become normal and healthy: less health and physical problems (e.g. short-of breath, co-morbidities, fertility); ablility to undertake normal activities (e.g. household activities, playing with childeren, duties at work); normal look (e.g. normal clothing); normal eating pattern and relationship with food.
  - The reactions of friends and family on the decision varies: some patients experience a lot of support while others receive very negative comments (e.g. waste of public money, easy way out) and experience stigmatization and lack of knowledge about bariatric surgery.
- Multidisciplinary team in the pre-surgery phase
  - Despite the mandatory character it can be observed that there exists a lot of variation between the centres regarding: team composition, tests performed, frequency of consultations, explanation given, duration…
  - The usefulness of the presurgery phase is not always clear: some patients experience it as 'something obligatory... not taken too seriously by the centres' or not considered as necessary because they 'Want to be operated as fast as possible'. Moreover, it is mostly the surgeon who makes the final decision and he can overrule the negative advice from other team members (e.g. psychologist or dietician).
  - The involvement of GP's in the decision is very heterogeneous but is in general very limited. This is due to patient factors (e.g. no GP or choice of patient not to imply GP, type of relationship with GP); GP-factors (e.g. no time, interest, negative attitude against BS); bariatric centre factors (e.g. limited efforts to improve involvement).
  - The presurgery pathway does not prepare to the post-operative period: the focus is on screening but not on therapy. Patients receive information on the technique of the operation and risks but information about practical consequences of the surgery is often limited. Patients state that the image depicted (or how they receive it) is often too positive. They miss information about loose hanging skin, relational/sexuality and alcohol. Information leaflets alone are insufficient; Patient need additional validated information (e.g. group sessions or regulated social media with operated patients). However, patients acknowledge that they are so much focused on the surgery (as a last resort to be no longer obese) that they are not receptive for information on the post-operative period.
  - Patients suggest that the duration of the pathway should not be too short in order to allow patients' thinking about the post-operative consequences but it should not be too long (less than 1 year) because of the risk of demotivation.
  - Involvement of a nurse in the bariatric team appears to support some patients.
- Post-surgery follow-up
  - Multidisciplinary follow-up is highly variable between centres in terms of healthcare professionals involved, duration and frequency, intensity of support, content, effort to increase follow-up adherence, communication with GP's, etc. The follow-up of patients in the bariatric centres is organised in different ways: some centres routinely schedule several appointments in

advance; others provide appointments on demand; some appear not to offer clear organized follow-up care at all.

- While some hospitals do not organize standardized follow-up at all, others do this for 1 or 2 years. Longer than two years is rare. Patients indicate that the time when they are discharged from specialized follow-up care is crucial. After all some experience it as a big step to contact the specialized caregivers after this period (e.g. because they feel they failed, are ashamed, etc).
- Patients experience medical care as important to detect complications and find it re-assuring. Nevertheless, they think the time of consultations is too short to deal with aspects besides medical care.
- Regarding psychological care the needs clearly vary : absent; support for new self-image, reaction of others, eating behaviors…; therapy for eating disorders, depression, substance abuse, ... One way of dealing with this variation in needs is working with 'available upon request consultations'. While this works for some this doesn't work for all (e.g. threshold to contact the healthcare professional).
- Patients state that the dietary and nutritional advice is focused on 'technical diet', often limited to first post-operative phase. They experience the need to complement this information with coaching and practical instructions (including advice to exercise, sport and how they have to (re-)organize their daily lives). Social media & peers are frequently consulted but the information is unfiltered and often not reliable.
- The specific expertise required to follow-up patients post-bariatric surgery is not always present among all healthcare professionals and dieticians (especially not outside the centres). This can lead to wrong or contradictory advices.
- Patients state that the coordination and follow up is less elaborated than the pre-surgery phase. They miss coordination and state that it is important to have someone for ad-hoc advice. Some patient state that they require 'assertive follow-up' to make sure that they are compliant.
- The reasons for non-adherence can be care-giver related (e.g. lack of coaching, no confidence in their expertise, no time, not empathic enough, …), patient-related (e.g. ashamed about failure, too busy lives, not motivated because they see no impact) or financial (too expensive vitamin supplements).
- The GP-involvement varies from being absent, over a passive involvement to a very active involvement. The latter is rare and the involvement of GP's is mostly limited (e.g. lab tests). They often lack expertise in bariatric surgery but are nevertheless the first person of contact in case patients experience problems. Therefore they should be able to recognise 'red flags (problems related to bariatric surgery for which a bariatric surgery centre intervention is required)' which is not always the case.

- Financial issues
  - The fact that required services (e.g. dietician, psychologists) and products (e.g. vitamine supplements) are not reimbursed has for some no impact on accessibility while for others it is a reason not to not use them;
  - The impact of loosehanging skin, the need for reconstructive surgery and the associated costs are not clearly communicated before the intervention but the consequences can be important in terms of well-being.
- Patients'feelings and suggestions
  - Most patients are satisfied with their decision to undergo surgery and do not regret it even when they experienced serious problems and complications.
  - Despite this high level of satisfaction and many positive aspects mentioned by them, some ambivalent feelings emerge from the

interviews. The results concern the impact on weight, physical health, body image, psychological health and social relations.

- Some organizational clues are suggested by the patients for improving the follow up (e.g. a nurse for the coordination, a multidisciplinary team available in one place, out-of-hours accessibility in face-to-face or by phone/e-mail).

Interview healthcare professionals

- Pre-surgery phase
  - It is mandatory but considered as insufficient for turning the patient into an actor responsible for his/her own progress (e.g. advice dietician not compulsory; insufficient time and depth to educate and engage patients).
  - The input from other healthcare professionals (as anaesthesist) and from GP is too limited and should be improved (especially for complicated and delicate cases).
  - Many patients see the preoperative stage as the entry gate for bariatric surgery and some of them can be manipulative to meet the legal inclusion criteria.
  - The duration of the pre-surgery phase can be very short as it is very easy for patients ("shopping behaviour") to find another surgeon ready to operate more rapidly. Information (e.g. necessary lifestyle adaptations, diet, financial implications) is given but not captured by the patient before the intervention.
  - Patients sometimes build false expectations on misleading information found via 'doctor google' and 'social media'.
- Post-operative phase
  - There is a lack of motivation among patients to adapt their lifestyle after bariatric surgery. This can be explained by different reasons (e.g. an underestimation of the importance of the changes because of an easy initial weight loss, perception of bariatric surgery as a quick fix solution; trends to change only if problems arise…). Consequences of this lack of motivation can be important: regain of weight, nutritional deficiencies etc.
  - The required long-term follow-up often fails because of patients (they considered themselves as cured; they do not dare to ask psychological support) but also because of organisational reasons (no incentives for patients to stay in the post-operative care pathway, lack of reimbursement of psychological consultations, insufficient capacity in bariatric care centres to organise follow-up due to increasing volume)
  - A standardized post-operative care pathway is needed in order to improve several issues:
    - Insufficient collaboration between healthcare professionals and between the 1st and 2nd line and heterogenity or incoherent approach during the management.
    - Trend of a medically oriented follow-up and underuse of psychologists, dieticians and physiotherapists consultations.
    - Follow-up not tailored to patients' needs (e.g. eating disorders, medical complications…).
  - A coordinator should be clearly designed, with a full-time position, a job description, financial ressources, suitable training… His potential missions are to guide patients through the pathway, perform administrative tasks, monitor follow-up adherence and make a link between primary and specialist caregivers.
  - Involvement of primary care providers is important because patients tend to trust their GP and a follow-up at patient"s home is needed after the hospital discharge. However this is challenging due to time constraints and lack of expertise (to refer the patients appropriately in case of problems, to give grounded advice on post-operative care…). Primary care providers should be trained and compensated for taking part in trainings or for

managing the care of bariatric patients. A collaboration between hospitals and GPs should also be organized.

- Regarding the financial aspect, post-operative care after bariatric surgery is usually not sufficiently reimbursed, except for consultations with physicians, physiotherapists and certain medication. The lack of reimbursement of (dieticians and psychologists) consultations and vitamin supplements can explain the attrition to follow-up. The cost of reconstructive surgery is another issue. There is a global underfunding of bariatric surgery within the entire country and on all levels.
- Alternative surgeries such as endoscopic (gastroscopic) plication are also a concern because they should be avoided but can attract some patients refused for bariatric surgery.
- The absence of a central registry is a major shortcoming in the system: to evaluate the care for bariatric patients on a national level; to monitor patients
- The priority solutions are not easy to be identified from the different groups of healthcare professionals and physicians but key elements are:
  - Reimbursement of consultations with psychologists and dieticians
  - Increasing patient involvement via patient education and training as well as via financial incentives (e.g. reduced co-payment) in case of follow-up adherence;
  - Development of a standardized care pathway including: criteria for inclusion; motivation of patients; protocol of postoperative care and caregivers involved; coordinator description, collaboration and referral between different care providers; quality criteria, information sessions and accreditation of healthcare professionals;
  - Improving collaboration between bariatric surgery centres and primary care (e.g. education of primary care givers, accreditation system, involvement in multidisciplinary collaboration);
  - Definition of centres of excellence (legalised framework), appointing coordinators and set-up of a registry with monitoring and benchmarking of outcomes

4 LITERATURE REVIEW GUIDELINES AND PATHWAYS

Disclaimer section 4. The research team carried out a systematic review of the literature in order to identify the key elements that have to be taken into consideration within a care pathway for bariatric surgery. The results of the literature review showed an overall lack of strong evidence which hampered a clear definition of the care pathway content. However, the KCE team found a lot of consensus-based key-interventions that could be adapted to the Belgian context. These key-interventions are described in this chapter as they had been mentioned in the literature. As such they cannot taken over. This will require a systematic consensus approach with Belgian experts as well as an update of the literature search.

4.1 Objective

This section focuses on the organization and functioning of care pathways before and after bariatric surgery as described in the scientific literature. The objective is to identify the key elements included in existing care pathways and to define potential factors hampering or facilitating their implementation in the Belgian care pathway.

4.2 Methods

A search for guidelines was performed in February 2018 and focused on guidelines published after the 1st January 2009. Twelve sources were explored such as the Guidelines International Network, the National Institute for Health and Care Excellence, the Scottish Intercollegiate Guidelines Network or the Belgium EBPracticenet (see Appendix to Chapter 4). The Cochrane database of systematic reviews and OVID-MEDLINE were also used with a limitation for the publication date after the 01/01/2013. A first selection was based on titles and abstracts and a second selection on full texts (Prisma flowcharts in Appendix to Chapter 4). Exclusion criteria were:

- Time period: <2009
- Population: Patients < 18 year; Non-Western countries
- Intervention: Focus on medical management of obesity; Gastric band only; Surgery for complications; Anesthesia and other peri-operative issues; Focus on a single and specific topic (e.g. vitamin D supplementation)
- Design: No guidelines
- Language: other languages than English, French and Dutch

An additional search strategy was developed by our information specialist (NF) in order to identify **existing care pathways** in three databases: OVID-MEDLINE, Embase and Cochrane. The search was performed on the 28th March of 2018 (detailed search strategy in Appendix to Chapter 4).

A first selection was based on titles and abstracts and a second selection on full texts (Prisma flowcharts in Appendix to Chapter 4). Exclusion criteria were:

- Time period: <2000
- Population: Patients < 18 year; Non-Western countries; Participants not yet undergone bariatric surgery or not yet involved in a professional care pathway in which bariatric surgery is one of the treatment options
- Intervention : Gastric band only; Surgery for complications; Anesthesia and other peri-operative, issues
- Experiences of surgery-specific issues
- Design: Animal studies; Editorial, opinion articles, conference abstracts and theses with no full-text article published; Qualitative studies (because included in another chapter of this report)
- Language: other languages than English, French and Dutch

A hand-search for interesting references (Guidelines or pathways) quoted in the selected literature completed this review.

An appraisal of each selected publication (guidelines or not) was performed on pre-selected criteria by one researcher (with control of few results by two

others). No single publication was excluded due to a low quality level but the appraisal level was used to define the strength of the key interventions proposed as the analysis results (see Appendix to Chapter 4).

4.3 Results: General considerations

Among the 32 publications retained, nine guidelines are based on a systematic review, with level of evidence and grading of recommendations (Welbourn 2018, EASO 2017, ASMBS 2017, O'Kane 2016, NICE 2014, AACE/TOS/ASMBS 2013, Heber 2010, SIGN 2010, HAS 2009)[16, 38-45]. Their quality level varies from moderate to very high (see Appendix to Chapter 4). Thirteen other guidelines (or publications providing clinical recommendations) with a low to a moderate quality level were also included in the analysis (Mingrone 2018, Ebpracticenet 2018, IFSO-EC/EASO 2017, Farmaka 2016, OMA 2016, Welbourn 2016, Sogg 2016, Parretti 2015, Mc Grice 2015, BOMSS 2014, BASO 2014, Mancini 2014, Agnetti 2011)[46-58]. Finally, ten publications focusing on care pathways for bariatric surgery were added to the selection (Kalarchian 2018, Montastier 2018, Aird 2017, Lamore 2017, BASO 2016, Hood 2016, Petrick 2015, Dumon 2011, Baccara-Dinet 2010, Funnell 2005)[59-67]. Their quality level was low or very low (see Appendix to Chapter 4).

A majority of authors emphasizes that there is a lack of robust evidence to support specific investigations or interventions before or after a bariatric surgery (Mingrone 2018, ASMBS 2017, O'Kane 2016, Agnetti 2015, SIGN 2010)[43-45, 47, 52]. This is why a lot of clinical recommendations are based on expert opinion and proposed as "Good practice points" (GPP) instead of real recommendations. The classification used by several authors are summarized in the Appendix to Chapter 4).

However, the aim of this review is not to provide clinical guidelines but to propose the key elements to be considered when establishing a care pathway for bariatric surgery. These key elements are presented in this document in several sub-sections as following: pre-operative period, decision making phase, post-operative follow-up (until 2 year), long term follow-up (>2 year), pregnancy concerns, and organizational level.

4.4 Pre-operative period

Efficacy and risks related to bariatric surgery are out of scope of this report and several inclusion criteria are defined elsewhere for the selection of patients (see 4.5. Decision making). . However, before making the decision, several steps are proposed in the literature in order to ensure a comprehensive assessment of the patient and provide sufficient information and advice for supporting behavioral changes. The two following sections focus on the pre-operative assessment on the one hand and the preparation programme before bariatric surgery on the other hand. A third section presents results regarding the composition of the team and the duration of the pre-operative period.

4.4.1 Pre-operative assessment

The need of a comprehensive pre-operative assessment is clearly mentioned throughout the literature but the evidence base to support specific investigations in preoperative period remains unsatisfactory and guidelines are mainly based on weak recommendations or expert opinion. The whole preoperative assessment encompasses several parts: medical history and physical examination, nutritional status evaluation, psychological/mental health evaluation, selective consultation with specialists, labs and technical examinations. One author suggests to organize this whole assessment during a one-day hospitalization (Baccara-Dinet 2010)[60].

4.4.1.1 Medical history and physical examination

A complete history taking and physical examination is clearly recommended before taking the decision for bariatric surgery (Mingrone 2018, Welbourn 2018, BASO 2014, Grade A BEL 1 AACE/TOS/ASMBS 2013, GPP HAS 2009)[40, 41{Mechanick, 2013 #4, 42, 52, 53].

This can include:

- **Weight and height/ BMI measurement; assessment of any trend in weight change** (e.g. weight loss history) (R Welbourn 2018, Grade A BEL 1 AACE/TOS/ASMBS 2013, Grade B HAS 2009)[40, 41].

- **Search of obesity causes** (Welbourn 2018, Mingrone 2018, Grade A BEL1 AACE/TOS/ASMBS 2013)[41, 42, 52]:
  - Screening for hormonal causes for weight gain (e.g. Cushing disease, hypothyroidism) can be considered if there is clinical suspicion based on specific historical and physical findings (C Welbourn 2018)[41].
  - Screening for rare genetic causes for weight gain if very early childhood onset and syndromic or unusual phenotype (C Welbourn 2018)[41].
- **Evaluation of obesity-related co-morbidities** (e.g. diabetes, hypertension, sleep disorders, heart failure, atrial fibrillation, chronic kidney disease, non-alcoholic fatty liver disease, polycystic ovary syndrome (PCOS), etc.) previously undiagnosed (Mingrone 2018, Welbourn 2018, ASMBS 2017, Mancini 2014, Grade A BEL1 AACE/TOS/ASMBS 2013, Grade B HAS 2009)[40-42, 45, 52, 58].
  - Assessment of **baseline functional status** (because it can be correlated with and predict perioperative outcomes). Functional health status is also an important data element captured by the Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program (MBSAQIP) registry to appropriately risk stratify patients preoperatively. As such all patients should be assessed at baseline (ASMBS 2017)[45].
  - Assessment of the **cardiac functional status** by questionnaire and metabolic equivalents (MET) (Mingrone 2018)[52].
  - Standardized screening (questionnaire) for **obstructive sleep apnea** (OSA) with confirmatory polysomnography if clinical symptoms or positive screening (Mingrone 2018, ASMBS 2017, Petrick 2015, Grade C BEL 3 AACE/TOS/ASMBS 2013, Grade C HAS 2009)[40, 42, 45, 52, 63].
  - **Scoring systems, such as the Edmonton Obesity Staging System (EOSS)** to assess individual risk better (C Welbourn 2018)[41].
- **Review and validation of existing diagnoses** (e.g. is breathlessness due to asthma (C Welbourn 2018)[41], thromboembolic risk (HAS 2009))[40].
- **Identification of medical reasons to exclude patients (because of increased risk) from surgery** (AACE/TOS/ASMBS 2013)[42]: e.g. cirrhosis, portal hypertension, active cancer, end-stage lung or kidney disease, severe heart failure, abdominal problem precluding laparoscopy (Mingrone 2018)[52].
- Patient history for active **substance use** including nicotine, alcohol, caffeine and other substances (Mingrone 2018, ASMBS 2017, OMA 2016)[45, 52, 57]. (See also section 4.4.2.4).
- **Check of medications:** The potential effects and consequences that any bariatric procedure may have on absorption and action of medications should be carefully considered before surgery, especially for medications where changes in blood levels may have critical effects on patients' conditions or can cause significant adverse events (3 C EASO 2017)[38].

This medical history and physical examination is an important part of the process determining the patients' eligibility for bariatric surgery. It is often performed by a specialised bariatric physician, the surgeon or an endocrinologist (Ebpracticenet 2018, BASO 2016)[55, 65].

Key intervention 1

A complete history taking and physical examination have to be performed before taking the decision for bariatric surgery (Strong). Issues to be considered should be at least weight/BMI trends, hormonal and genetic obesity causes if not identified previously, obesity related co-morbidities, medical reasons to exclude patients from surgery, substance abuse and medications use (Weak).

4.4.1.2 *Nutritional status assessment*

Several guidelines recommend a nutritional status assessment before proposing bariatric surgery (Welbourn 2018, ASMBS 2017, BOMSS 2014, Grade A BEL 1 AACE/TOS/ASMBS 2013, HAS 2009)[40-42, 45, 54]. However the content of this evaluation is rarely described in details (Mancini 2014, Agnetti 2011)[47, 58].

This can include:

- **Weight history and previous nutritional or dietetic management** (Agnetti 2011)[47].
- **Eating behaviours :**
  - Qualitative and/or quantitative **food consumptions** (including alcohol consumption) (Agnetti 2011[47]).
  - Previous or current eating disorders (e.g. binge eating) (ASMBS 2017, Mancini 2014, BOMSS 2014, NICE 2014, AACE/TOS/ASMBS 2013, Agnetti 2011, HAS 2009)[16, 40, 42, 45, 47, 54, 58]. This assessment can also be included in the psychological evaluation (ASMBS 2017, AACE/TOS/ASMBS 2013)[42, 45].
- **Mastication capacity** including tooth status (GPP HAS 2009)[40].
- **Deficiencies in macro- and micronutrients** (Welbourn 2018, BOMSS 2014, Mancini 2014, Grade A BEL 1 AACE/TOS/ASMBS 2013, Agnetti 2011, HAS 2009)[40-42, 47, 54, 58]. In comparison with purely restrictive procedures, more extensive perioperative nutritional evaluations are required for malabsorptive procedures (Grade A BEL 1 AACE/TOS/ASMBS 2013)[42].

A **standardised tool** ("un support de recueil de données standardise") is recommended to be used for performing the dietician assessment (Agnetti 2011)[47].

Key intervention 2

Prior to bariatric surgery, a comprehensive nutritional status assessment is recommended (Strong). This assessment can encompass weight and dietetic history, eating behaviours (with identification of eating disorders), macro- and micronutrients deficiencies and mastication capacity (GPP). The use of a standardised dietician checklist tool can be considered (GPP).

4.4.1.3 *Psychosocial-behavioural evaluation*

Many guidelines consider the need of a **psychosocial-behavioural evaluation** for all patients before bariatric surgery and provide some content of this evaluation (IFSO-EC/EASO 2017, ASMBS 2017, Grade 3D EASO 2017, Sogg 2016, BOMSS 2014, NICE 2014, Mancini 2014, Grade C BEL 3 AACE/TOS/ASMBS 2013, GPP SIGN 2010, Grade C HAS 2009)[16, 38, 40, 42, 43, 45, 46, 48, 54, 58]. The inclusion of a **clinical interview** is very common with often psychometric testing (Sogg 2016)[46]. The involvement of a **psychologist (or even a psychiatrist)** within the MDT team is highlighted by several authors (R Welbourn 2018, Lamore 2017, Mancini 2014, HAS 2009)[40, 41, 58, 64]. However, some parts of this evaluation could also be performed by **a dietician** (Agnetti 2011)[47] with specific experience in bariatric nutrition, screening for eating disorders, and psychosocial assessment (BOMSS 2014)[54]. Whatever the initial training (in psychology, social work, psychiatric nursing, psychiatry, etc.) of the health professional involved in this psychosocial evaluation, he/she should be **qualified** to assess behavioural, emotional, psychosocial and psychiatric domains and he/she should possess specialized knowledge, experience and training relevant to obesity, eating disorders and bariatric surgery (Sogg 2016)[46].

One primary objective of the psychosocial-behavioural evaluation is to identify risk factors or potential post-operative challenges that may contribute to a postoperative poor outcome (Sogg 2016)[46]. This implies to:

- Detect any **mental health disorder** representing a **potential contraindication to surgery** such as active uncontrolled psychiatric illness (e.g. major depression and psychotic disorders), substance or alcohol use disorders, severe personality disorders, severe eating

disorders, self-harm and suicidal behaviours in past 12 months (R Welbourn 2018, Mingrone 2018, Lamore 2017, IFSO-EC/EASO 2017, Sogg 2016, Mancini 2014, Grade C HAS 2009)[40, 41, 46, 48, 52, 58, 64]:

- It is highlighted that the **prevalence of mental health disorders** (such as depression, personality disorders, eating disorders, and suicide attempts) appear to be higher among candidates for bariatric surgery than in the general population (Lamore 2017, Sogg 2016)[46, 64].
- **Current and past mental health treatment** (including multiple or recent psychiatric hospitalizations) can reflect psychiatric instability or severity. This can also allow to contact the current **providers** for input on diagnostic profile, current medication, history of adherence, etc. (Sogg 2016)[46].
- In case of identified or suspected psychiatric disease or substance abuse or addiction, a **proper mental evaluation with psychiatrics** should be done (Ebpracticenet 2018, Mancini 2014, Grade C BEL3 AACE/TOS/ASMBS 2013)42, 55, 58. This consultation with a psychiatrist can also allow to assess the patient ability to be engaged in the post-operative behavioural changes and follow-up (Ebpracticenet 2018)[55].
- Among the disorders mentioned above, it is important to identify those that are a **formal contraindication for surgery** and **those that can be managed before and/or after surgery** (EASO 2017, IFSO-EC/EASO 2017, Sogg 2016)[38, 46, 48]. History of past (i.e. fully remitted) substance abuse or dependence should not be considered a contraindication for bariatric surgery if the duration of recovery is sufficient (at least 1 year) (Sogg 2016)[46]. Binge-eating disorder, dysfunctional eating behaviour, psychological dysfunction or depression should not be considered as absolute contraindications for surgery (Grade C SIGN 2010)[43]. The severity of psychiatric symptoms (and their impact on the patient functioning) are of particular importance in determining surgery outcomes (Sogg 2016)[46]. For example, patients suffering from eating disorders or serious mental illness (e.g., schizophrenia) can have access to bariatric surgery, as long as their disorder is treated and stabilized (Lamore 2017)[64].
- This classification can be translated in a **traffic light system** (patients not currently suitable for surgery vs patients who may be suitable although deemed at higher risk and require psychological treatment before being considered) (Welbourn 2016)[56].
- The result of the psychological assessment should be **clearly communicated** to both the patient and the rest of the bariatric team (Sogg 2016)[46].

Besides the focus on mental health disorders, **individual, familial and environmental factors** can be assessed before bariatric surgery in order to identify **areas of potential vulnerability** factors that can be sources of poor outcomes. This implies to:

- Obtain a **comprehensive history of weight trajectory over time** with information on interventions that have been tried, duration of adherence and helpful factors or barriers to sustained behavioural change (Sogg 2016)[46].
- Identify **eating disorders symptoms** (e.g. binge eating disorder as a sign of loss of control or a way of coping with negative emotions; anorexia nervosa, grazing…). This implies that the evaluator is familiar with the most current diagnostic criteria for these disorders (Sogg 2016)[46].
- Search for **past stressors** associated with obesity and weight regain such as a history of physical or emotional trauma, childhood/adult adversity (sexual and physical assault, emotional neglect) (R Welbourn 2018, OMA 2016, Grade C HAS 2009)[40, 41, 57].
- Identify **current stressors** (e.g. divorce, severe illness or recent death of a loved one) that may affect **patient self-care and engagement** to postoperative care requirements (R Welbourn 2018, Ebpracticenet 2018, Sogg 2016, Welbourn 2016, NICE 2014, Grade C BEL 3 AACE/TOS/ASMBS 2013)[16, 41, 42, 55, 56]. Pre-surgical distress could worsen whenever the results of the surgery were not meeting the patients' expectations or have not led to the hoped improvements in

quality of life. Such distress might be associated with manifested depression and potentially suicidality (EASO 2017)[38].

- Assess the **cognitive functioning** and the patient's basic comprehension skill because they hamper the ability to give informed consent and adherence to behavioural changes (Sogg 2016)[46]. This is particularly relevant in older patients. Cognitive testing and information gathered from collateral sources such as parents, spouse, other healthcare providers can be useful (Sogg 2016)[46].
- Identify the **social and economic conditions** impacting the access to a balanced-diet (Agnetti 2011)[47].
- Assess the **patient's life conditions such as work rhythm, feeding rhythm, physical activities and life project** (Agnetti 2011)[47].
- Assess impact of weight on **quality of life** (Sogg 1016, Grade C HAS 2009)[40, 46]. This assessment can provide insight on the reasons patients have seeking bariatric surgery and on expectations about surgery outcome (Sogg 2016)[46].
- Identify patients with **unrealistic expectations** of the impact of surgery on weight loss and life change (R Welbourn 2018, Sogg 2016, Mancini 2014, Agnetti 2011)[41, 46, 47, 58].
- Assess patient **motivation and willingness** to adhere to follow-up programmes (IFSO-EC/EASO 2017, Lamore 2017, Mancini 2014, Agnetti 2011, Grade C HAS 2009)[40, 47, 48, 58, 64].
- Identify patients with weight gain from **psychotropic medications** (R Welbourn 2018, Welbourn 2016)[41, 56].

The psychosocial assessment is also important to search **positive factors** that can support patient adherence to behavioural changes. This is an opportunity to:

- Evaluate existing **coping mechanisms** (OMA 2016)[57] and **social resources** (Lamore 2017, IFSO-EC/EASO 2017, Mancini 2014, Agnetti 2011, Grade C HAS 2009)[40, 47, 48, 58, 64]. Social support can be assessed by asking the patient about the presence and quality of relationships with romantic partners, friends, family members and community organizations (Sogg 2016)[46].
- Assess **past adherence behaviours** (e.g. attending appointments, taking medications as prescribed, continuous positive airway pressure use, etc.) because it provides estimates of post-operative adherence (Sogg 2016)[46].
- Assess the **patient's knowledge** concerning the kind of considered surgery, its risk and impact on diet and lifestyle, including the need of lifetime follow-up (Sogg 2016, Mancini 2014, Agnetti 2011)[46, 47, 58]. Patient should be able to verbalize an understanding of the need to be an active participant in one's own care and a commitment to adhere to the post-operative behavioural changes (Sogg 2016)[46].
- Identify **interventions** that can enhance long term compliance and weight maintenance (e.g. crisis intervention, psychological support, psychotherapy) (IFSO-EC/EASO 2017)[48] to be declined in a individually tailored support plan.
- Develop a **trusting relationship between the behavioural health clinician and the patient** (Sogg 2016)[46]. According to the ASBMS, "it is particularly important for the evaluator to communicate to the patient that his or her role is to work with the patient to be able to proceed to surgery and to ensure the best possible outcome afterward". This can increase the patient's willingness to be open and candid during the evaluation and to seek behavioural support after surgery if needed (Sogg 2016)[46].

Finally, the preoperative psychosocial evaluation can provide information of importance to the **other healthcare professionals** involved in the pre- and post-operative care (Sogg 2016)[46]. The final report should include a summary of the relevant findings of the interview and, when applicable, other sources of information. Requirements and/or recommendations for the pre and post-operative psychosocial management of the patient should also be described and discussed directly with the patient and other team members (Sogg 2016)[46].

Key intervention 3

A psychosocial-behavioural evaluation should be performed to detect any severe mental health disorder representing a formal contraindication to surgery or requiring a specific pre- or post-operative management to enhance the safety and efficacy of surgical treatment (Weak). The psychosocial-behavioural evaluation can also assess areas of vulnerability and positive factors that can be considered in an individually tailored support plan if appropriate (GPP). The relevant findings can be summarized in a final report with suggestion of interventions to minimize barriers and risk of poor outcome (GPP). A direct communication of these results to the patient and the other bariatric team members is suggested (GPP).

4.4.1.4 Additional consultations with specialists

The routine preoperative assessment as mentioned above is not sufficient in all circumstances and additional consultations with specialists can be indicated according to patients' characteristics, co-morbidities or other criteria. However, few guidelines specify the indication for these selective consultations before bariatric surgery (Table 14).

Table 14 – Indication for consultation with specialist in preoperative phase of bariatric surgery, by kind of consultation

Anesthesist High risk patients ASA 3 or greater (and patients considered "unfit" and/or those with a history of problems with anaesthesia) should have an anaesthesia preoperative evaluation, preparation, and education visit scheduled prior to surgery. Evaluation should include assessment and management for intravenous access, monitoring, aspiration risk, postoperative nausea and vomiting, fluid management, needed analgesia, airway and ventilation management.	Welbourn 2018, ASMBS 2017
Cardiovascular Consult Cardiovascular referral is indicated prior to surgery in patients with unstable coronary syndromes, history of recent myocardial infarction with ongoing ischemic risk factors, unstable or severe or mild angina, decompensated or compensated heart failure, significant arrhythmias, high-grade atrio-ventricular blocks, certain arrhythmias and severe valvular disease, diabetes mellitus and renal insufficiency, abnormal ECG, rhythm other than sinus, low functional capacity, uncontrolled systemic hypertension and previous stroke, obstructive sleep apnea with hypertension, exertional dyspnea, and evaluation for perioperative β-adrenergic blockade, significant family or personal cardiac disease or any other condition the clinician feels a consultation is warranted.	Welbourn 2018, ASMBS 2017, Petrick 2015, Mancini 2014, Grade D AACE/TOS/ASMBS 2013
Endocrinology Consult For patient with Type I and Type 2 Diabetes preoperative glycemic control is recommended with goals for Hemoglobin A1c of 6.5 to 7.0% or less, fasting blood glucose of less than or equal to 110 mg/dL; 2-hour postprandial blood glucose concentration of less than or equal to 140ml/dl. Endocrinology consultation should be considered for those patients with poorly controlled hyperglycemia.	ASMBS 2017, Petrick 2015

Gastroenterology Consult Consultation with a gastroenterologist may be considered for those patients with severe gastrointestinal (GI) symptoms not previously encountered elsewhere in the recommendations	ASMBS 2017
Hematology Consult Patient with factors that place them at high-risk for venous thromboembolism (VTE) after bariatric surgery may include known hypercoagulable condition should be referred to hematologist for evaluation.	ASMBS 2017
Nephrology Consult Patients with pre-existing kidney disease, end stage renal disease, those on hemodialysis and those with a renal transplant should be considered for preoperative evaluation.	ASMBS 2017
Pain Management Consult Patients with chronic opioid use or dependence, opioid tolerance, suboxone use and those with anticipated needs for chronic pain management should be considered for preoperative consultation with a pain management specialist.	ASMBS 2017
Pharmacist Consult Patients with polypharmacy, transplant recipient, extended release medications, and/or anticoagulation may receive a pharmacy referral to review medication transition to liquid or crushed forms of medication and rapid-release medications.	ASMBS 2017
Pulmonary Specialist Consult Pulmonary referral is indicated for abnormal chest radiography, positive polysomnography, or history of intrinsic lung disease (such as chronic obstructive pulmonary disease, asthma, pulmonary fibrosis, pulmonary hypertension and chronic pulmonary embolism).	ASMBS 2017, Welbourn 2018, Petrick 2015, Mancini 2014, Grade C BEL 3 AACE/TOS/ASMBS 2013
Sleep Medicine Consult Patients with clinical symptoms or positive screening for OSA or obesity hypoventilation syndrome (OHS) should be referred to sleep medicine for further evaluation.	ASMBS 2017, Welbourn 2018
Others such as Infectious disease, Neurology, Orthopaedics, Rheumatology, Urology, Obstetrics/gynaecology…	ASMBS 2017

Key intervention 4

Additional consultations with specialists can be indicated according to patients' characteristics, co-morbidities or other criteria (GPP).

4.4.1.5 Labs examinations

Although several guidelines mentioned that lab examinations are needed before bariatric surgery (Mingrone 2018, ASMBS 2017, BOMSS 2014, Grade A BEL 1 AACE/TOS/ASMBS 2013, HAS 2009)[40, 42, 45, 52, 54], there is discussion for some of them if they have to be used routinely. Table 15provides a picture of the current situation based on several guidelines.

Table 15 – List of labs examination recommended in the preoperative phase of bariatric surgery

Labs examination	Routine	Specific cases
Blood type, Complete blood count	Mingrone 2018, ASMBS 2017, BOMSS 2014, AACE/TOS/ASMBS 2013, Heber 2010	
Hemoglobine	HAS 2009	
Coagulation profile: INR/Prothrombin time/Partial thromboplastin time	ASMBS 2017, AACE/TOS/ASMBS 2013	
Iron studies **Ferritin, transferrin iron saturation**	Mingrone 2018, AACE/TOS/ASMBS 2013, Heber 2010 BOMSS 2014, HAS 2009	
Glycated hemoglobin (HbA1c)	Mingrone 2018, ASMBS 2017, BOMSS 2014	Patients with suspected or diagnosed prediabetes or diabetes (Petrick 2015, AACE/TOS/ASMBS 2013)
Fasting blood glucose **Glucose**	Mingrone 2018, BOMSS 2014, AACE/TOS/ASMBS 2013, Heber 2010 ASMBS 2017 (as a part of the Basic metabolic panel)	
Lipid panel, lipid profile	Mingrone 2018, BOMSS 2014, Grade A AACE/TOS/ASMBS 2013	
Liver function tests	Mingrone 2018 (aminotransferase), ASMBS 2017, BOMSS 2014, AACE/TOS/ASMBS 2013, Heber 2010, GPP HAS 2009	
Renal function, without details **Creatinine** **Electrolytes (e.g. Sodium, potassium, CO2, chloride)**	AACE/TOS/ASMBS 2013 Heber 2010, ASMBS 2017 (as a part of the Basic metabolic panel)	

Labs examination	Routine	Specific cases
Blood urea nitrogen	Mingrone 2018, ASMBS 2017 (as a part of the Basic metabolic panel), BOMSS 2014, Heber 2010 ASMBS 2017 (as a part of the Basic metabolic panel), BOMSS 2014,	
Albumin/prealbumin	ASMBS 2017, Heber 2010, HAS 2009	
Bone mineral density and body composition	Heber 2010	
Vit B1 (Thiamine)	HAS 2009	ASMBS 2017[k]
Vit B9 (folic acid): RBC folate, homocysteine, methylmalonic acid optional	BOMSS 2014, AACE/TOS/ASMBS 2013, Heber 2010, HAS 2009	
Vit B12	Mingrone 2018, BOMSS 2014, AACE/TOS/ASMBS 2013, Heber 2010, HAS 2009	ASMBS 2017[z]
25-vitamin D	Mingrone 2018[l], ASMBS 2017, (Grade B O'Kane 2016), BOMSS 2014, AACE/TOS/ASMBS 2013, SIGN 2010, Heber 2010, HAS 2009,	
Vit A & Vit E	Heber 2010 (Vit A)	Patients undergoing malabsorptive procedures based on symptoms and risks AACE/TOS/ASMBS 2013
Calcium	BOMSS 2014, SIGN 2010, Heber 2010, HAS 2009 ASMBS 2017 (as a part of the Basic metabolic panel)	
Zinc Micronutrients, not otherwise specified	Heber 2010 ASMBS 2017	
TSH	ASMBS 2017 Routine screening not recommended because obesity appears to be associated with TSH elevation in the absence of primary thyroid disease (Grade D AACE/TOS/ASMBS 2013)	Patients with symptoms or increased risk of thyroid disease (Grade B BEL 2 AACE/TOS/ASMBS 2013)
Parathyroid hormone (PTH)	Mingrone 2018, BOMSS 2014, Heber 2010	

[k] There is a contradiction between the summary 2017 and the report 2016: selective Vit B1 & Vit B12 in the summary and routine in the report.

[l] According to Mingrone 2018 however, there is no evidence to show that correction of vitamin D deficiency reduce metabolic complication after surgery[52]

Labs examination	Routine	Specific cases
C-reactive protein	Mingrone 2018	
Urine analysis	ASMBS 2017, AACE/TOS/ASMBS 2013	
Pregnancy test for all female patients of childbearing age **Plasmatic beta-HCG (48 hours before surgery)** **Urine human chorionic gonadotropin (HCG)**	Mingrone 2018 HAS 2009 ASMBS 2017	
Androgens (total/bioavailable testosterone, DHEAS, D4-androstenedione)		Patients with PCOS suspicion (AACE/TOS/ASMBS 2013)
Screening for Cushing's syndrome (1 mg overnight dexamethasone test, 24-hour urinary free cortisol, 11 pm salivary cortisol)		If clinically suspected (AACE/TOS/ASMBS 2013)
Urine toxicology screening		Patients suspected of substance abuse (should be selective and used as a supplement, not intended to replace patient self-reporting regarding substance abuse or abstinence) (ASMBS 2017)
Urine nicotine **Cotinine/nicotine level**	If patient was smoking at time of initial nutritional consultation (Petrick 2015)	May be required by insurance to ensure compliance with preoperative smoking cessation (ASMBS 2017)

Key intervention 5

Some labs tests are consistently quoted to be routinely performed such as blood type, complete blood count, coagulation profile, iron/ferritin/transferrin, fasting blood glucose, lipid panel, liver function test, renal function, vitamin B9 (ac folic), vitamin B12, vitamin D, calcium, PTH and pregnancy tests for all female patients of childbearing age (Weak).

4.4.1.6 Technical examinations

Few technical examinations are routinely recommended before bariatric surgery (see Table 16). For example, the value of polysomnography as a routine investigation is controversial (Mingrone 2018). Those arguing for a routinely examination mention the high prevalence of obstructive sleep apnea (OSA) in the bariatric patient population (up to 94% with a significant number undiagnosed (38%)) (Mingrone 2018) but most of authors prefer to test only patients with preoperative positive screening (based on standardized questionnaires) (ASMBS 2017, AACE/TOS/ASMBS 2013)[42, 45].

Table 16 – List of technical examinations recommended in the preoperative phase of bariatric surgery

Technical examination	Routine	Specific cases
Chest radiography	(Mingrone 2018, ASMBS 2017, Grade C BEL 3 AACE/TOS/ASMBS 2013)	
ECG	(Mingrone 2018, ASMBS 2017, AACE/TOS/ASMBS 2013)	
Arterial blood gas measurement		In the formal pulmonary evaluation for patients with intrinsic lung disease or disorders sleep patterns (Grade C BEL 3 AACE/TOS/ASMBS 2013)
Endoscopy or Upper gastrointestinal (UGI) series, or to detect peptic ulcer disease, hiatal hernias, gastric malignancies, oesophageal mucosal abnormalities related to gastro-oesophageal reflux, and the presence of Helicobacter pylori infection.	(GPP HAS 2009)	Patients with symptoms of GERD (such as heartburn, regurgitation, dysphagia, or any postprandial symptoms that suggest a foregut pathology and/or who chronically use antisecretory medication) (Mingrone 2018, Ebpracticenet 2018, ASMBS 2017, Grade D AACE/TOS/ASMBS 2013) Patients 60 years old (Ebpracticenet 2018)
Screening for the presence of Helicobacter pylori	(Ebpracticenet 2018, Petrick 2015, HAS 2009)	In high prevalence areas (Grade C BEL 3 AACE/TOS/ASMBS 2013) Based on patient factors (ASMBS 2017)
Manometry and pH study		Based on symptomatology to include oesophageal motility disorder and severe acid reflux despite proton pump inhibitors in patients selecting relief (ASMBS 2017)
Gastric emptying study		Patients with clinical symptoms or studies concerning for delayed gastric emptying (ASMBS 2017)
Colonoscopy		Patients with unexplained abdominal symptoms, hematochezia/melena, iron deficiency of unknown cause or family/personal history of colonic pathology. Otherwise national screening guidelines should be followed (ASMBS 2017)
Abdominal ultrasound (+ a viral hepatitis screen)	Abdominal ultrasound is not recommended as a routine screen for liver disease (because the prevalence of abnormal liver function tests is low in obese patients and generally due to non-alcoholic fatty liver disease (Grade C BEL 3 AACE/TOS/ASMBS 2013)	Patients with increased liver function tests (2 to 3 times the upper limit of normal) or symptomatic biliary disease (ASMBS 2017, Grade D AACE/TOS/ASMBS 2013)

Technical examination	Routine	Specific cases
Liver biopsy at the time of surgery		To document steatohepatitis and/or cirrhosis that may otherwise be unknown due to normal appearance and/or liver function tests (Grade D ACE/TOS/ASMBS 2013)
Non-invasive cardiac testing (e.g. echocardiography) beyond an electrocardiogram		On the basis of the individual risk factors and findings on history and physical examination e.g. if cardiac disease or pulmonary hypertension suspected (Mingrone 2018, Petrick 2015, Grade B ACE/TOS/ASMBS 2013)
Venous ultrasound or appropriate diagnostic of deep venous thrombosis (DVT)		Patients with a history of deep venous thrombosis, cor pulmonale or who are at high risk based on evidence of venostasis, known or familial hypercoagulable state or increased right sided heart pressures (ABSMS 2017, Grade D ACE/TOS/ASMBS 2013)
Polysomnography		If clinical symptoms or positive screening for obstructive sleep apnea (Mingrone 2018, ASMBS 2017, Petrick 2015, Grade C BEL 3 AACE/TOS/ASMBS 2013)
Preoperative dual-energy X-ray absorptiometry (DEXA)	There are insufficient data to warrant preoperative assessment of bone mineral density with DXA outside formal osteoporosis guidelines (Grade D AACE/TOS/ASMBS 2013)	In oestrogen-deficient women and in premenopausal women and men who have conditions associated with bone loss or low bone mass to establish a baseline before bariatric surgery (ASMBS 2017, IFSO-EC/EASO 2017, BOMSS 2014) Before BPD/DS procedure, in younger postmenopausal women and men aged 50 to 69 with clinical risk factors for fracture (BOMSS 2014)
Cancer screening		According to their age and risk and because obesity is a risk factor for certain malignancies (ASMBS 2017, Grade C Bel 3 ACE/TOS/ASMBS 2013)

Key intervention 6

Few technical examinations are routinely considered before bariatric surgery i.e. ECG and chest radiography (Weak).

Other examinations can be prescribed according to clinical symptoms or risk factors: Endoscopy, Upper gastrointestinal (UGI) series, H-Pylori testing, abdominal ultrasound, DEXA, polysomnography (GPP).

Finally, because obesity is a risk factor for certain malignancies, all patients should be encouraged to have routine cancer screening by a primary care provider based on age and risk factors. These screening tests should be done according to the current national guidelines (Weak).

4.4.2 Pre-operative preparation programme

The candidate for bariatric surgery should receive sufficient explanation to make an informed decision. Also counselling to be prepared to the surgery and to the post-surgery behavioral changes should be given. Moreover, some underlying co-morbidities required a pre-operative management. All these issues are presented below.

4.4.2.1 Patient information for informed consent

Several guidelines emphasise the importance of informed consent in the decision making process for surgery bariatric (ASMBS 2017, IFSO-EC/EASO 2017, NICE 2014, AACE/TOS/ASMBS 2013)[16, 42, 45, 48]. And because informed consent is a dynamic process, there should be a thorough discussion with the patient regarding:

- **Procedure options with their benefits** (e.g. potential weight loss) and associated **risks** (complication, perioperative mortality...) (ASMBS 2017, IFSO-EC/EASO 2017, NICE 2014, Mancini 2014,Grade D AACE/TOS/ASMBS 2013, HAS 2009)[16, 40, 42, 45, 48, 58];
- **Experience of the surgeon** with the specific procedure offered and whether the hospital has an accredited bariatric surgery programme (NICE 2014, Grade D AACE/TOS/ASMBS 2013, HAS 2009)[16, 40, 42];
- **Length of stay (1-2 nights) and pathway information** (Ebpracticenet 2018, ASMBS 2017)[45, 55];
- **Potential (limited) outcomes of surgery, risk of recurring eating pathology and realistic expectations** (because the tendency of patients to endorse unrealistic expectancies for weight loss) (IFSO-EC/EASO 2017, Sogg 2016, AACE/TOS/ASMBS 2013)[42, 46, 48];
- **Surgery short term consequences on the food and drink options** (e.g food splitting) (Agnetti 2011)[47];
- **Dietary and lifestyle changes** that are required before and after surgery (ASMBS 2017, IFSO-EC/EASO 2017, Sogg 2016, Mancini 2014, Agnetti 2011, HAS 2009)[40, 45-48, 58] (see point 4.4.2.2 Nutritional counselling);
- **Risk of nutritional deficiencies and potential need for some micronutrients supplementation** (Grade D AACE/TOS/ASMBS 2013, Agnetti 2011)[42, 47] **(**more info on the 4.6.2 Post-operative programme);
- Adaptation of **medication**: e.g. adaptation of anti-diabetic medication or insulin in order to minimize risks of hypoglycaemia (Mancini 2014)[58]; discontinuation of oestrogen therapy before bariatric surgery (1 cycle of oral contraceptives in premenopausal women; 3 weeks of hormone replacement therapy in postmenopausal women) to reduce the risks for postoperative thromboembolic phenomena (Mancini 2014, Grade D AACE/TOS/ASMBS 2013)[42, 58];
- Requirements for **long-term follow-up** (including costs required to maintain appropriate follow-up) and the risks associated with insufficient follow-up (ASMBS 2016, IFSO-EC/EASO 2017, Grade D AACE/TOS/ASMBS 2013, HAS 2009)[40, 42, 48];
- **Complications symptoms** (e.g. signs, trigger factors and preventive actions of dumping syndrome) (Agnetti 2011)[47];
- Potential for post-operative **increased suicide risk and transfer substance use disorders**, including risk for alcohol misuse (EASO 2017, Sogg 2016, OMA 2016)[38, 46, 57];

- **Financial information** (Grade D AACE/TOS/ASMBS 2013)[42];
- Information on **recontructive and aesthetic surgery** (NICE 2014, SIGN 2010, HAS 2009)[16, 40, 43].

This discussion with the patient can be performed by the bariatric surgeon or the hospital specialist and should also include the person's family, as appropriate (NICE 2014)[16]. It is important to ensure that the patient has **fully understood** the information and is able to be an active participant in one's own care with **commitment** for the follow-up (Sogg 2016, HAS 2009)[40, 46]. The informed consent should be documented (e.g. in the person's notes, in the patient record) (NICE 2014)[16].

Some authors highlight that all patients should participate in **educational group sessions** organized by the bariatric centre prior to decision for bariatric surgery (ASMBS 2017, Grade D AACE/TOS/ASMBS 2013)[42, 45].

Patients should also have been advised, prior to surgery, of **local patient support groups** and **online forums and websites** such as http://www.wlsinfo.org.uk/ and http://www.bospauk.org/ (ASMBS 2017, Grade D O'Kane 2016, Sogg 2016, NICE 2014)[16, 44-46].

Finally, **patients with cognitive difficulties deserve specific** interventions such as individual rather than group sessions, involvement of a member of the patient's social or family network in the discussion, inclusion of a responsible caregiver in education sessions, provision of instructions in simpler language, etc.) (Sogg 2016)[46].

Key intervention 7

A truly informed consent and active participation in one's own care are suggested for all patients before deciding for bariatric surgery (GPP). This implies a thorough discussion between the surgeon or the hospital/centre bariatric specialist and the patient, with person's family as appropriate (GPP). Understanding of surgery options, risks and benefits, and acceptance of lifestyle modification, including behavioral changes and follow-up compliance are important points of discussion (GPP).

Educational support such as group sessions organized by the bariatric center, local patient support groups and social media (online forums, websites) can be useful for sustaining the patient information and education (GPP). It is suggested to adapt educational support for patients with cognitive difficulties (GPP) and to document the informed consent in the patient record (GPP).

4.4.2.2 Nutritional counselling

Nutritional counselling before bariatric surgery is quoted by some guidelines (ASBSM 2017, Welbourn 2016, Agnetti 2011, GPP SIGN 2010, GPP HAS 2009)[40, 43, 47, 56] but the content of this pre-operative nutritional management is poorly described in the literature. Three elements can be distinguished within the nutritional programme: informational (described in the point 2.3.4.1), educational, and therapeutic (Agnetti 2011)[47]. The educational programme on diet can promote health gains and develop new skills for endorsing diet behavioural changes (Agnetti 2011)[47]; the therapeutic programme can allow to obtain the best possible nutritional status (e.g. proteins intake) before surgery (Agnetti 2011)[47].

The dietary educational programme should be individually tailored for each patient according to the **assessment of patient's needs and expectations and the kind of surgery** (HAS 2009)[40]. This programme can encompass:

- Explanation of the **relationship between eating habits and weight** aiming to help patients understand the necessary changes in eating habits to improve health and identify risk factors and vulnerabilities so that interventions can be planned to address and improve them (Welbourn 2016)[56].
- Teaching **patients to better identify the psychological signals** of hunger, appetite, satiety (Agnetti 2011)[47].
- Teaching **patients to perform dietary and lifestyle changes** that are required before and after surgery (ASMBS 2017, IFSO-EC/EASO 2017, Mancini 2014, Agnetti 2011, HAS 2009)[45, 47, 48, 58]. For example:
  - **food splitting** (Agnetti 2011)[47];

- need for **proteins (**Agnetti 2011)[47];
- time needed to eat meals (reduce tachyphagie) (Agnetti 2011)[47];
- chewing properly (Agnetti 2011)[47];
- varied and balanced diet, food selection (Agnetti 2011, HAS 2009)[40, 47];
- cooking technical (HAS 2009)[40];
- management of situations that cause grazing (Agnetti 2011)[47].

- Counselling for losing **weight before surgery**. Several authors emphasise that preoperative weight loss in bariatric surgical patients is not mandatory and is at the discretion of the surgery team on a case by case basis (Mingrone 2018, ASMBS 2017, AACE/TOS/ASMBS 2013)[42, 45, 52]. Some authors highlight that participation in pre-operative weight loss programmes does not lead to greater post-surgical weight loss (2+ SIGN 2010)[43] and that weight gain or inability to lose weight prior to surgery should not preclude consideration for a bariatric procedure (Welbourn 2018, ASMBS 2017)[41, 45]. However, preoperative weight loss can reduce liver volume and may help improve the technical aspects of surgery **in patients with an enlarged liver or fatty liver disease** and is therefore encouraged before bariatric surgery (Ebpracticenet 2018, BOMSS 2014, Grade B BEL 1, downgraded due to inconsistency results AACE/TOS/ASMBS 2013)[42, 54, 55]; preoperative weight loss or medical nutritional therapy may also be used **in selected cases to improve co- morbidities**, such as reasonable preoperative glycaemic targets (Grade D AACE/TOS/ASMBS 2013)[42].

The **therapeutic programme** is poorly described in the literature which focuses mainly on the **prescription of multivitamin and mineral supplement** for patients following a low calorie/low carbohydrate diet immediately prior to surgery (e.g. to shrink the size of the liver) (BOMSS 2014)[54] or counselling regarding sufficient protein intake(Agnetti 2011)[47]. An old guideline considered calcium and vitamin D supplements (800 IU per day cholecalciferol) for all patients undergoing bariatric surgery (with a baseline calcium and vitamin D measured to avoid iatrogenic hypercalaemia) (GPP SIGN 2010)[43].

Whatever the content of the preoperative nutritional programme, an **evaluation** should be organized in order to verify the patient appropriation of the knowledge and skills (Agnetti 2011, GPP HAS 2009)[40, 47]. The informational, educational and therapeutic elements of the programme have also to be **registered in the patient record** (Grade C Agnetti 2011)[47].

The MDT can be involved in the educational programme with an important involvement of the dietician and/or the nutritionist (GPP HAS 2009)[40].

Key intervention 8

Nutritional counselling is considered as an important phase in the preoperative management of obese patients and can encompass informational, educational and therapeutic elements (GPP). The dietary preparation can be tailored for each patient and can allow patients to develop new skills for endorsing diet behavioural changes and improve nutritional status before surgery.

It is suggested to perform an evaluation for assessing the efficacy of the programme in terms of knowledge and skills (GPP). It is also suggested to document the elements of the nutritional programme in the patient record (GPP).

4.4.2.3 Other lifestyle advices

Diet is not the single lifestyle advices that can be included in the pre-operative educational programme. Some guidelines mention also physical activity, smoking and alcohol use. This can summary as the following:

- **Physical activity** should be discussed before the surgery with each individual patient in order to choose a regular and appropriate activity for the post-operative phase (GPP HAS 2009)[40]. The proposed programme of physical activities should be gradual and adapted to the patient's musculoskeletal and cardio-pulmonary conditions, lifestyle and preferences (GPP HAS 2009)[40].
- **Tobacco use** should be avoided at all times by all patients. In particular, patients who smoke cigarettes should stop, preferably at least 6 weeks before bariatric surgery (Welbourn 2018 & 2016, ASMBS 2017, Petrick

2015, Grade A BEL 2 upgraded by consensus AACE/TOS/ASMBS 2013)[41, 42, 45, 63].

- **Alcohol control**: Regardless of the alcohol history of the morbidly obese individual, all bariatric surgery-seeking candidates should be educated on the potential effects of this intervention, especially in the case of RYGB, in order to minimise the risk of alcohol use disorders post-operatively (2C EASO 2017, Sogg 2016)[38, 46]. For patients identified with alcohol dependence a mandatory abstinence of 1-2 years is recommended prior to surgery (ASBSM 2017, Sogg 2016)[45, 46].

Key intervention 9

It is suggested to advise all patients to integrate a physical activity adapted to their musculoskeletal and cardio-pulmonary conditions, lifestyle and preferences at a regular basis in their daily life (GPP). Patients who smoke cigarettes have to stop, preferably at least 6 weeks before bariatric surgery (Strong). Patients identified with alcohol dependence should be abstinent at least 1 year before surgery and all patients should be informed on the risk of alcohol use disorder post-operatively, especially in the case of RYGB (Weak).

4.4.2.4 Psychological support

According to several guidelines, a **psychological support** should be available before surgery (IFSO-EC/EASO 2017, NICE 2014, GPP SIGN 2010, HAS 2009)[16, 40, 43, 48].

This support can be proposed according to the pre-operative evaluation and can lead to an **individually management tailored plan** (IFSO-EC/EASO 2017, Lamore 2017)[48, 64]. The goal of this plan is to enhance patients' motivation and ability to comply with nutritional, behavioral and psychosocial changes before and after surgery (IFSO-EC/EASO 2017)[48]. For example, binge eating disorders can necessitate a psychotherapeutic approach to facilitate behavioral changes that can enhance long-term quality of life (Mingrone 2018)[52].

The content of the psychosocial support is poorly described in the selected guidelines and encompasses behavioral or motivational therapy, medications, etc (Lamore 2017)[64].

A **concertation with the MDT team** is paramount if the psychological support is performed by an external psychologist or psychiatrist (GPP HAS 2009)[40].

Key intervention 10

Support by psychologist/psychiatrist specialized in bariatric surgery and obesity is considered in the preoperative bariatric surgery phase for providing individually tailored management plan if appropriate (GPP). The goal of this plan is to enhance patients' motivation and ability to comply with nutritional, behavioral and psychosocial changes before and after surgery (GPP).

4.4.2.5 Management of underlying co-morbidities

Optimizing treatment of co-morbidities is recommended by some guidelines in order to reduce the risks of the surgical procedure (Freed 2017, NICE 2014, AACE/TOS/ASMBS 2013, Grade B HAS 2009)[16, 40, 42]. This leads to several recommendations:

- Preoperative **glycemic control** should be optimized **using a diabetes comprehensive care plan**, including healthy dietary patterns, medical nutrition therapy, physical activity, and as needed, pharmacotherapy (Mingrone 2018, Grade A BEL 1 AACE/TOS/ASMBS 2013)[42, 52]. However inability to achieve this should not prevent or delay referral for bariatric surgery (Welbourne 2018)[21]. **Reasonable targets** for preoperative glycemic control, which may be associated with improved bariatric surgery outcomes, include a hemoglobin A1c value of 6.5%-7.0% or less, a fasting blood glucose level of ≤110 mg/dL and a 2-hour postprandial blood glucose concentration of ≤140 mg/dL (http://www.aace.com/sites/default/files/DMGuidelinesCCP.pdf) (Grade A BEL 1 AACE/TOS/ASMBS 2013)[42]. More liberal preoperative

targets, such as an A1c of 7%-8%[m], have to be considered in patients with advanced microvascular or macrovascular complications, extensive comorbid conditions, or long-standing diabetes in which the general goal has been difficult to attain despite intensive efforts (Grade A BEL 1 AACE/TOS/ASMBS 2013)[42].

- Patients found to be **hypothyroid** have to be treated with L-thyroxine monotherapy (Grade A BEL 1 AACE/TOS/ASMBS 2013)[42].
- Patients with **hyperlipidaemia** should be treat according the national guidelines (Grade D AACE/TOS/ASMBS 2013)[42].
- Standard preoperative management of **OSA** using continuous positive airway pressure (CPAP) is mentioned (AACE/TOS/ASMBS 2013)[42].
- Patients with a history of **deep venous thrombosis** (DVT) should undergo an appropriate diagnostic evaluation (Grade D AACE/TOS/ASMBS 2013)[42]. Routine use of inferior vena cava filter placement is not recommended but may be considered in combination with chemicals and mechanicals prophylaxis for high-risk patients in whom the risk of venous thromboembolism (VTE) is greater than the significant risks of filter-related complications (ASMBS 2017)[45]. High-risk patients may include high BMI, advanced age, immobility, prior history of VTE, venous stasis disease, hormonal therapy, expected operative time duration or open approach and male gender (ASMBS 2017, AACE/TOS/ASMBS 2013)[42, 45].
- Before bariatric surgery, prophylactic treatment for **gouty attacks** should be considered in patients with a history of gout (Grade C BEL 3 AACE/TOS/ASMBS 2013)[42].

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Some co-morbidities should be managed before bariatric surgery to reduce the risk of the surgical procedure (Weak): diabetes has to be managed by a comprehensive care plan including healthy dietary patterns, medical nutrition therapy, physical activity, and as needed, pharmacotherapy (Strong); other co-morbidities to be considered are hypothyroidism, hyperlipidaemia, OSA syndrome, DVT and gout (GPP).

4.4.3 Composition of the team and duration of the pre-operative period

4.4.3.1 Composition of the team

The recommendations in the literature are consistent about the fact that comprehensive preoperative assessment as well as management of patients who are candidates for obesity surgery have to be performed by a **multidisciplinary/interdisciplinary team** (MDT) (IFSO-EC/EASO 2017, NICE 2014, BOMSS 2014, BASO 2014)[16, 48, 53, 54]. This point is developed in the section 4.9 “Organizational level”. Yet we mention here the kind of professionals who can be involved in the MDT in the pre-operative phase, according to some patients characteristics:

- endocrinologist or physician specializing in the care of patients with overweight or obesity (also called bariatric physicians[n]) for the medical evaluation (OMA 2016, Mancini 2014, BASO 2014)[53, 57, 58];
- bariatric surgery specialist (IFSO-EC/EASO 2017, OMA 2016, Mancini 2014)[48, 57, 58];

[m] • In patients with A1c >8% or otherwise uncontrolled diabetes, clinical judgment determines the need for bariatric surgery (Grade D).

[n] Bariatric physicians are licensed Doctor of Medicine (MD) or Doctor of Osteopathy (DO) who specializes in medical weight management. They may treat overweight and obese patients with diet, nutrition, exercise, behavioral therapy, appropriate medications, or any combination of these treatments

- mental health professional (psychologist, psychiatrist) (OMA 2016, Mancini 2014, BASO 2014)[53, 57, 58];
- dietician or nutritionist[o] (IFSO-EC/EASO 2017, OMA 2016, Mancini 2014, BASO 2014)[48, 53, 57, 58];
- specialist in cardiology, pulmonary, gastroenterology, and/or other specialists as indicated (see point 2.3.3) (OMA 2016, IFSO-EC/EASO 2017)[48, 57];
- anaesthetist (IFSO-EC/EASO 2017)[48];
- nurse practitioner, social worker (IFSO-EC/EASO 2017)[48];
- gynaecologist for pregnancy counseling (in females) (BASO 2014)[53];
- smoking cessation counsellors (for smokers) (BASO 2014)[53].

Moreover, several authors highlight that the management of patients who are candidates for obesity surgery should be performed in collaboration with the general practitioner (R Welbourn 2018, Baccara-Dinet 2010, HAS 2009)[40, 41, 60].

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A multidisciplinary/interdisciplinary team (MDT) has to be involved in the management of patients who are candidates for obesity surgery (Strong). Endocrinologist or related physician, bariatric surgeon, mental health professional (psychologist, psychiatrist) and dietician (or nutritionist) should be the healthcare professionals forming the core of this MDT (Weak).

General practitioners should be involved in the preoperative management of patients (Weak).

[o] Dieticians and nutritionists are not the same: https://nutritionsciencedegree.org/#same

[p] GPP are good practice examples based on clinical experience and expert consensus.

4.4.3.2 Duration

Duration of the pre-operative period is poorly described in the literature: one author recommended at least **6 months** of multidisciplinary management before considering bariatric surgery (Agnetti 2011[47]) and a preparation of **1 or even 2 years** is sometimes needed (e.g. for patients identified with current alcohol dependence)[45]. Given the content of the assessment and the preparation programme described above, it is clear that several months are needed in a lot of cases.

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The duration of the preoperative phase is not clearly defined and can take several months (GPP)[p].

4.5 Decision making

Inclusion criteria

Because the inclusion criteria including the BMI threshold and kind of co-morbidities to be considered in Belgium were defined in a previous KCE report, we have not included this topic in the current literature review.

However, we found several inclusion criteria added by some authors beside the required BMI threshold and the potential presence of co-morbidities. These additional criteria can be categorized as following:

- CLINICAL SITUATION
  - Clinical evidence that the increase in body fat is pathogenic (OMA 2017)[57];
  - Inability to lose weight or to maintain long term adequate, clinically beneficial weight loss[q] despite appropriate non-surgical

[q] According to SIGN 2010, significant and sustained improvement in the comorbidities

comprehensive medical care (IFSO-EC/EASO 2017, NICE 2014, SIGN 2010)[16, 43, 48];

- Confirmation of an attempt at pre-operatory weight loss (OMA 2017, Petrick 2015)[57, 63]; Successful[r] participation in a collective programme (EBPracticenet 2017)[55] or intensified treatment (IFSO-EC/EASO 2017)[48] for decreasing weight;
- Patient medically optimised with no medical, surgical, anaesthetic, nutritional, psychological, psychiatric or social contraindication (Welbourn 2018)[41];
- Assessment performed by a physician trained in comprehensive management of overweight and obesity (OMA 2017)[57].

- INFORMATION:
  - Understanding of the risk-benefits or potential limited outcomes (Welbourn 2018, IFSO-EC/EASO 2017)[41, 48]
  - Realistic knowledge of the surgery impact (EBPracticenet 2017)[55];
  - Realistic expectation (Welbourn 2018)[41] ;
  - Understanding of nutritional requirements after surgery and need for life-long follow-up (Welbourn 2018)[41];
- MOTIVATION:
  - Attendance to at least 2 bariatric support groups meetings (Petrick 2015)[63], a bariatric nutrition class (Petrick 2015)[63] and a behaviorial class (Petrick 2015)[63].
  - Demonstrated compliance with scheduled medical appointment (IFSO-EC/EASO 2017)[48], medical programme (Petrick 2015)[63] or commitment to the need for long term follow-up (OMA 2017, NICE 2014)[16, 57].
  - Commitment to follow the post-op recommended lifestyle changes (IFSO-EC/EASO 2017, OMA 2017, NICE 2014)[16, 48, 57].
- ABILITY:
  - Ability to change his food behaviour and to adapt himself to another body image (EBPracticenet 2017)[55].
  - Green light provided by registered dietician and behavioural medicine (Petrick 2015)[63].
- Other
  - Specific insurance criteria (OMA 2017)[57].

Exclusion criteria

Several authors mention specifically some reasons for excluding (sometimes temporary) access to bariatric surgery:

- PHYSICAL HEALTH
  - Contra-indication to anaesthesia (NICE 2014, HAS 2009)[16, 40]
  - Diseases threatening life in the short term (IFSO-EC/EASO 2017, Mancini 2014, HAS 2009)[40, 48, 58] or mean term (HAS 2009)[40];
  - Severe systemic diseases (e.g. cirrhosis, diseases that increase the risks of bleeding or infection, severe heart diseases) (EBPracticenet 2017)[55];
  - Disease of the upper digestive tract (EBPracticenet 2017, HAS 2009)[40, 55];
  - Current non-adherence to treatment (Welbourn 2016)[56];
  - Need of a continuous treatment by anti-inflammatory (EBPracticenet 2017)[55];

[r] According to EBPracticenet, successful = weight decrease of 7% but without reaching a sufficient BMI or without persisting. Several authors emphasised that a pre-operatory weight loss that leads the patient below the required BMI for surgery is not a reason for excluding the patient (IFSO-EC/EASO 2017, Mancini 2014, HAS 2009)[40, 48, 58].

- Pregnancy (HAS 2009)[40].

- MENTAL HEALTH/COGNITIVE FUNCTION
  - Non-stabilized psychiatric diseases (EBPracticenet 2017)[55], active psychotic disorders (IFSO-EC/EASO 2017, Welbourn 2016, Mancini 2014) [48, 56, 58], severe personality disorders (Welbourn 2016) [56], severe depression (IFSO-EC/EASO 2017, Mancini 2014)[48, 58], suicidality (Sogg 2016)[46] or self-harm in the past 12 months (Welbourn 2016), cognitive or mental disorders (Welbourn 2016, HAS 2009)[40, 56], dementia (Welbourn 2016)[56] unless specifically advised by a psychiatrist experienced in obesity (IFSO-EC/EASO 2017)[48];
  - Severe and non-stabilized eating disorders (EBPracticenet 2017, IFSO-EC/EASO 2017, Welbourn 2016, HAS 2009)[40, 48, 55, 56];
  - Alcohol abuse and/or drug dependencies (IFSO-EC/EASO 2017, EBPracticenet 2017, Welbourn 2016, Mancini 2014, HAS 2009)[40, 48, 55, 56, 58];
  - Recent significant life event (e.g. bereavement or relationship breakdown) (Welbourn 2016)[56];
  - Severe learning disability (Welbourn 2016)[56].

- MOTIVATION/ABILITY
  - Absence of identifiable medical management (IFSO-EC/EASO 2017, Mancini 2014, HAS 2009)[40, 48, 58] or Inability to lose weight, even temporary, with a conservative management (EBPracticenet 2017)[55];
  - Inability to participate in a prolonged medical follow-up (IFSO-EC/EASO 2017, HAS 2009)[40, 48];
  - Inability to care for himself and lack of long term family and social support that will warrant such care (IFSO-EC/EASO 2017, Mancini 2014)[48, 58].

According to SIGN 2010, binge eating disorder, dysfunctional eating behaviour, past history of intervention for substance misuse, psychological dysfunction or depression should not be considered absolute contra-indication for bariatric surgery (SIGN 2010)[43].

Moreover some contra-indications can be temporary and need a re-assessment after management (Welbourn 2016, HAS 2009)[40, 56].

Composition of the team

According to several authors, the decision about surgery for obesity should be undertaken **by a multidisciplinary team (MDT)** (IFSO-EC/EASO 2017, NICE 2014, HAS 2009)[16, 40, 48]. The multidisciplinary team includes at least one surgeon, one physician specialised in obesity (nutritionist, endocrinologist or internist), one dietician, one psychiatrist or psychologist and one anaesthetist (HAS 2009)[40]. A nurse and an ambulatory physician (referring physician or GP) could also be included (Baccara-Dinet 2010)[60]. The MDT preferably meets physically (or audio-visually) to discuss all patients at least once before deciding for bariatric surgery (Welbourn 2018 & 2016, BASO 2014)[41, 53, 56].

Patient' inform consent

As mentioned above in the point 4.4.2.1, the decision-making process should result from a **true informed consent** based on in-depth discussions with the patient (ASMBS 2017, IFSO-EC/EASO 2017, NICE 2014, AACE/TOS/ASMBS 2013)[16, 42, 45, 48]. The discussion should also involve the **patient's family**, as appropriate (NICE 2014)[16].

The conclusions of this consensus must be:

- formalised and recorded in the patient's file (Welbourn 2018, Grade D AACE/TOS/ASMBS 2013, HAS 2009)[40-42];
- communicated to the patient, to all members of the multidisciplinary team (as well as other specialists (e.g. cardiologist) involved in patient's care) and to the general practitioner if not involved (Welbourn 2018, HAS 2019)[40, 41].

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The decision for bariatric surgery should result from a concertation process within the specialised multidisciplinary bariatric team with involvement of the general practitioners, patients and the patients' family (GPP). Some green lights 'checklists' can support and stimulate a true informed consent process (GPP). It is suggested that the results are documented in the patient record and communicated to the patient, to all members of the multidisciplinary team (as well as other specialists involved in patient's care) and to the general practitioner (GPP).

4.6 Post-operative follow-up during the first 2 years

Bariatric surgery is associated with specific diagnostic, preventive and therapeutic needs (EASO 2017)[38]. A follow-up by a bariatric team (by telephone and in person) at regular intervals post-surgery is recommended at least during 2 years by several guidelines (Ebpracticenet 2018, Rec NCEPOD in O'Kane 2016, NICE 2014)[16, 44, 55] but without strength of recommendation. This first two years of follow-up are described in this section 4.6.. The long-term follow-up (i.e. after these two first years) is presented in the sections 4.7. This threshold of "2 years" is rather arbitrary, based on current practice in several countries but does not preclude a longer duration of the follow-up by the bariatric centre.

4.6.1 Post-operative monitoring

The post-operative monitoring encompasses the medical history/clinical examination, the nutritional assessment, the psychological assessment, the labs and technical examinations.

4.6.1.1 Medical history and clinical examination by surgeon or allied HCP

The first consultation with the surgeon aims to check the operation wound(s), the general postoperative recovery, the dietary progression and general monitoring (ASMBS 2017)[45].

In general, the consultation includes:

- **Monitoring of weight (and record of weight)** (Ebpracticenet 2018, O'Kane 2016, Grade B HAS 2009)[40, 44, 55].

  Significant weight regain or failure to lose weight should prompt evaluation for (a) decreased patient adherence with lifestyle modification, (b) evaluation of medications associated with weight gain or impairment of weight loss, (c) development of maladaptive eating behaviors, (d) psychological complications, and (e) radiographic or endoscopic evaluation to assess pouch enlargement, anastomotic dilation, formation of a gastrogastric fistula among patients who underwent a RYGB, or inadequate band restriction among patients who underwent a LAGB. (Grade B BEL 2 for AACE/TOS/ASMBS 2013)[42].

- **Monitoring of nutritional intake** (including protein and vitamins see point 4.6.1.2) (Ebpracticenet 2018, NICE 2014, Grade A; Bel 1 in AACE/TOS/ASMBS 2013, GPP HAS 2009)[16, 40, 42, 55].

- Assessment of **fluid intake and hydric balance** (Ebpracticenet 2018)[55].

- **Search for risk factors for deficiencies** (e.g. alcohol consumption) (Farmaka 2016)[49].

- Check if patients take the **appropriate multivitamins and minerals** (see chapter 4.6.1.2) for the surgery performed (Ebpracticenet 2018, O'Kane 2016)[44, 55] and search for clinical signs (in particular neurological signs but also hair loss, hematoma, muscles weakness, taste disorders…) of **malnutrition or vitamin deficiencies** (Farmaka 2016, SIGN 2010, Grade C HAS 2009)[40, 43, 49]; the dietician can help for the supervision of the assessment of nutritional and trace mineral status and dietary replacement (Welbourn 2018)[41].

- Identification of **complications or malfunctioning** of the surgical construction, such as stricture or symptomatic hernia (O'Kane 2016)[44] or post-prandial hypoglycaemia (Welbourn 2018)[41].
- Monitoring of **alcohol** (not only because risk of vitamin deficiency) **and other substance use disorders** (Sogg 2016)[46].
- Monitoring for **comorbidities** such as diabetes, HTA, dyslipidemia, obstructive sleep apnea (O'Kane 2016, NICE 2014, Grade B HAS 2009[16, 40, 44]. For example, patients treated for obstructive sleep apnea should be reviewed by a sleep clinic to adjust or discontinue assisted ventilation (Welbourn 2018)[41].
- **Quality of life** evaluation (Grade C HAS 2009)[40].
- Regular assessment of **medications** for other obesity-related and non-obesity-related conditions and adjustment, e.g. blood pressure, epilepsy, diabetes management, anticoagulation… (see point 4.6.2.7) (Welbourn 2018, O'Kane 2016, NICE 2014)[16, 41, 44]; Primary care physicians may be best placed to take the lead about medication management with the support of the medical and surgical MDTs (Welbourn 2018)[41]. After surgery, plasma drug levels should be checked more frequently for those drugs requiring periodic plasma levels control (3C EASO 2017)[38].

This assessment can be performed **by surgeons or by appropriately trained healthcare professionals** who have easy access to a surgeon if required (O'Kane 2016)[44]. If the assessment is performed in primary care, the bariatric service should liaise closely with GP and other specialists involved in patient care (e.g. diabetes physicians), along the line of a shared care model of chronic disease (Welbourn 2018)[41]. This implies a clear identification of red flags requiring referral to the surgical team (Welbourn 2018)[41].

In order to **encourage patients' involvement in their care and patients empowerment** (see point 4.6.2.1 Patient education), one author suggests not to begin the consultation by a review of the patients' diet, exercise and weights, but by asking them how they are feeling (psychologically as well as physically) and how they believe that they are doing in reaching their self-selected goals and caring for themselves (Funnell 2005)[59].

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During the first 2 years after bariatric surgery, the follow-up is generally provided by the bariatric service. Regular medical history and clinical examination can encompass monitoring of weight, nutritional intake, vitamin and mineral intake, complications or malfunctioning, co-morbidities, quality of life and assessment of medication (GPP). These regular examinations could be performed by surgeons or by appropriately trained healthcare professionals who have easy access to a surgeon if required (GPP). Starting the consultation by focusing on the patient's feelings can encourage patient's empowerment and involvement (GPP).

4.6.1.2 Nutritional assessment

As mentioned above, dieticians or nutritionists are considered as essential members of the MDT team for the routine follow-up care after bariatric surgery (EASO 2017, ASMBS 2017, O'Kane 2016)[38, 44, 45] and regular nutritional assessment is recommended (NICE 2014, SIGN 2010)[16, 43]. Some authors highlight they have to be specifically trained in bariatric surgery care (O'Kane 2016, Mancini 2014)[44, 58] and should have access to a surgeon/bariatric physician/clinical psychologist if there are any concerns (NICE and NCEPOD recommendations in O'Kane 2016)[44].

The timing of the follow-up by dietician varied depending on the authors and could be adapted by the dietician with the other members of the MDT (Agnetti 2011)[47]. The bariatric dietician usually has the most frequent contact with the patient among the MDT members. This frequency is particularly high during the first year post-surgery; the frequency of follow-up may decrease in the second year (O'Kane 2016)[44]. Some appointments could be performed by telephone (O'Kane 2016)[44].

The content of the dietician assessment is poorly linked with evidence in the literature and is, in general, a reflection of good-practice examples. Based on the few publications detailing this content, a dietician assessment can include the evaluation of:

- Patient ability to incorporate **nutritional and behavioral changes** (Grade C; Bel 3 AACE/TOS/ASMBS 2013, GPP Agnetti 2011)[42, 47];
- Appropriate **intake of proteins** (GPP Agnetti 2011)[47];
- **Sufficient hydration** i.e. at least 1 L/day, outside meal (GPP Agnetti 2011)[47].
- Adherence to **vitamin and mineral supplement prescriptions** (O'Kane 2016, GPP Agnetti 2011)[44, 47];
- **Complications** that must imply a referral to a specialist (GPP Agnetti 2011)[47];
- Practical difficulties during the **meal preparation** (GPP Agnetti 2011)[47];
- Impact of the surgery on the **familial, social relationships** (GPP Agnetti 2011)[47];
- **Feelings** about the food intake (pleasure, hunger, etc.) (GPP Agnetti 2011)[47];
- Impact on the **work/food rhythm, physical activity** (GPP Agnetti 2011)[47].

The assessment results should be registered **in the patient record** (Grade C Agnetti 2011)[47].

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A comprehensive nutritional assessment can be systematically proposed to the patient after bariatric surgery and can be performed by specifically trained dieticians (GPP). Dieticians can verify the appropriateness of the diet, the (compliance with) behavioural changes (including vitamins and mineral supplementation if appropriate) and identify potential problems requiring a referral to other healthcare professionals (GPP). They can also check the impact of the nutritional and behavioural changes on the patient's practical life and wellbeing (GPP). It is suggested to register the results of the assessment in the patient record (GPP).

4.6.1.3 Psychological assessment

After bariatric surgery, patients have to deal with major changes (e.g., weight and identity) and some of them can develop anorexic/bulimic disorders or alcohol (or other substance) use disorders (EASO 2017, Lamore 2017, SOGG 2016)[38, 46, 64]. An excess of suicides post-operatively is also quoted (EASO 2017)[38]. Moreover preexisting psychological disorders can lead to post-operative complications and less post-operative weight loss (Welbourn 2018, Lamore 2017, Mc Grice 2015)[41, 51, 64].

Therefore an assessment of the psychology/psychiatric status after bariatric surgery is considered by several guidelines with access to an appropriate support if the patient requires it (Lamore 2017, 3D EASO 2017, NCEPOD in O'Kane 2016, Mc Grice 2015, NICE 2014, GPP SIGN 2010)[16, 38, 43, 44, 51, 64]. The healthcare professional involved in this assessment is not clearly specified in the selected literature.

The aim of this psychological monitoring is to:

- Assess the **psychological, social, and family impact** of the surgery (Lamore 2017, NICE 2014, GPP HAS 2009)[16, 40, 64];
- Identify **potential difficulties** to ensure the required behavioral changes (GPP HAS 2009)[40];

- Identify patients who **become vulnerable after surgery** by developing depressive illness, risk of self-harm and suicide, eating disturbance or body image disturbance (Welbourn 2018, Lamore 2017, Mc Grice 2015, NICE 2014)[16, 41, 51, 64];
- Identify **post-operative alcohol or other substance use disorders** (Welbourn 2018, Sogg 2016)[41, 46].

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A psychological assessment should be systematically proposed to the patient (Weak). It is suggested that the assessment encompasses the psychological, social, and family impact of surgery with the aim to identify patients that require psychology/psychiatric support (GPP).

4.6.1.4 Labs examination

The risk of nutritional deficiencies is high after bariatric surgery (mainly after RYGB, BDP, BDP/DS) and routine micronutrients supplementation is a key element of the post-operative programme. However this usual supplementation does not ensure an absolute prevention of deficiencies over time, mainly because of individual variations in micronutrient absorption, nutritional requirements and compliance. Therefore, periodic laboratory routine surveillance for nutritional deficiencies is recommended, and supplementation should be individualised accordingly in patients with demonstrated micronutrient insufficiencies or deficiencies (3D EASO 2017)[38]. Moreover, routine monitoring of other biochemical, hematological and metabolic changes is also highly recommended following bariatric surgery (3D EASO 2017, GRADE A O'Kane 2016, 1+++ Heber 2010)[38, 39, 44].

As shown in the Table 17 and Table 18, the content and the periodicity of this monitoring differ between authors.

Table 17 – List of labs examination recommended after bariatric surgery

Labs examination	Routine	Specific cases
Complete blood count, platelets	For all patients (EASO 2017, Ebpracticenet 2018, Farmaka 2016, Parretti 2015, BOMSS 2014, Heber 2010[s], SIGN 2010) After RYGB, BPD or BPD/DS (IFSO-EC/EASO 2017)*	
Coagulation profile : INR (International Normalized Ratio)/Prothrombin time/Partial thromboplastin time	After BPS-BPD/DS (EASO 2017, IFSO-EC/EASO 2017) in order to adapt antivit K or measure vit K deficiency (not a real rec in Heber 2010)	
Iron, ferritin, transferrin, and total iron binding capacity	For all patients (EASO 2017, OMA 2016, Parretti 2015, BOMSS 2014, Grade D AACE/TOS/ASMBS 2013)	Depending on clinical signs and kind of surgery (Grade C HAS 2009) If needed (Ebpracticenet 2018)

[s] At 1, 3, 6, 12, 18, 24 months

Labs examination	Routine	Specific cases
	After RYGB, BPD or BPD/DS (IFSO-EC/EASO 2017, Heber 2010)	
Plasma glucose, HbA1c if indicated (e.g. diabetes)	For all patients (Ebpracticenet 2018, Farmaka 2016, Heber 2010) After RYGB (IFSO-EC/EASO 2017	If preop diabetes (BOMSS 2014)
Lipid level (& need for lipid-lowering medication) (Grade D)	For all patients (Farmaka 2016, Grade D AACE/TOS/ASMBS 2013)	If preop pre-existing treated dyslipidaemia (Ebpracticenet 2018, Farmaka 2016, BOMSS 2014)
Liver function tests	For all patients (Farmaka 2016, Parretti 2015, BOMSS 2014, Heber 2010[2]) After RYGD & BDP (IFSO-EC/EASO 2017)	If needed (Ebpracticenet 2018)
Renal function **Electrolytes**	For all patients (Ebpracticenet 2018, EASO 2017, Farmaka 2016, BOMSS 2014, Heber 2010[2]) After RYGD & BDP (IFSO-EC/EASO 2017) For all patients (Heber 2010)[2] After BPD (IFSO-EC/EASO 2017)	
Creatinine	Farmaka 2016, BOMSS 2014	If needed (Ebpracticenet 2018)
Uree		
Albumin, prealbumin (in order to ensure a sufficient protein intake)	For all patients (Ebpracticenet 2018, Farmaka 2016, BOMSS 2014, SIGN 2010) After RYGB, BPD or BPD/DS (IFSO-EC/EASO 2017, Heber 2010) After BPS-BPD/DS (EASO 2017)	Depending on clinical signs and kind of surgery (Grade C HAS 2009)
Vit B1 (Thiamine)	**Routine screening is not recommended for all** (BOMSS 2014, Grade C BEL 3 AACE/TOS/ASMBS 2013) After RYGB (IFSO-EC/EASO 2017) If jejunum bypass (Heber 2010)	In patients with rapid weight loss, poor dietary intake, protracted vomiting, parenteral nutrition, excessive alcohol use, neuropathy or encephalopathy, oedema or heart failure (OMA 2016, Farmaka 2016, BOMSS 2014, O'Kane 2014, Grade D AACE/TOS/ASMBS 2013, Heber 2010 Depending on clinical signs and kind of surgery (Grade C HAS 2009)

Labs examination	Routine	Specific cases
Vit B9 (Folic acid)	For all patients (EASO 2017, OMA 2016, Parretti 2015, BOMSS 2014) After RYGB, BPD or BPD/DS (Farmaka 2016, Heber 2010) After RYGB (IFSO-EC/EASO 2017)	If anaemia without iron deficiency (Grade C BEL 3 AACE/TOS/ASMBS 2013) Depending on clinical signs and kind of surgery (Grade C HAS 2009)
Vit B12 (Cobalamin)	For all patients (Ebpracticenet 2018, EASO 2017, Parretti 2015, OMA 2016, Farmaka 2016, BOMSS 2014, Grade B BEL 2 AACE/TOS/ASMBS) After RYGB, BPD or BPD/DS (IFSO-EC/EASO 2017, Heber 2010)	Depending on clinical signs and kind of surgery (Grade C HAS 2009)
Vit D	For all patients (Ebpracticenet 2018, EASO 2017, OMA 2016, O'Kane 2016, Parretti 2015, BOMSS 2014) After RYGB, BPD or BPD/DS (IFSO-EC/EASO 2017, Farmaka 2016, 1+++ Heber 2010)	Depending on clinical signs and kind of surgery (Grade C HAS 2009)
Calcium	For all patients (OMA 2016, Farmaka 2016, Parretti 2015, BOMSS 2014, SIGN 2010) After RYGB, BPD or BPD/DS (IFSO-EC/EASO 2017, 1+++ Heber 2010) After BPD ()	
24-H U-calcium, osteocalcin	After RYGB or BPD-BPD/DS (EASO 2017),	Depending on clinical signs and kind of surgery (Grade C HAS 2009)
Parathyroid hormone (PTH)	For all patients (EASO 2017, OMA 2016, Parretti 2015, BOMSS 2014) After RYGB, BPD or BPD/DS (IFSO-EC/EASO 2017, Farmaka 2016, 1+++ Heber 2010)	Depending on clinical signs and kind of surgery (Grade C HAS 2009)
Bone alkaline phosphatase	After RYGB, BPD or BPD/DS (1+++ Heber 2010) After BDP (IFSO-EC/EASO 2017)	
Vit A	After BDP or BDP/DS (EASO 2017, OMA 2016, Farmaka 2016, Parretti 2015, BOMSS 2014, Grade C BEL 3 AACE/TOS/ASMBS 2013	Depending on clinical signs and kind of surgery (Grade C HAS 2009)

Labs examination	Routine	Specific cases
	After RYGB, BPD or BPD/DS (Heber 2010)	If concerns regarding steatorrhea or symptoms of deficiency (e.g. night blindness) after RYBP (BOMSS 2014)
Vit E	**Insufficient evidence to support routine screening** (BOMSS 2014, Grade D AACE/TOS/ASMBS 2013**)** After BPD and BPD/DS (EASO 2017)	if unexplained anaemia, neuropathy after RYBP & BPD/DS (BOMSS 2014)
Vit K	**Insufficient evidence to support routine screening** (BOMSS 2014, Grade D AACE/TOS/ASMBS 2013) After BPD and BPD/DS (OMA 2016, Heber 2010)	In the presence of an established fat-soluble vitamin deficiency with hepatopathy, coagulopathy, or osteoporosis, assessment of a vitamin K1 level should be considered (Grade D For AACE/TOS/ASMBS 2013). If excessive bruising/coagulopathy, after RYBP & BPD/DS (BOMSS 2014)
Other vitamin deficiencies : VitB2 Riboflavin; VitB3 Niacin; Vitamin B5/pantothenic acid; Vitamin B6/pyridoxine; Vitamin B7/biotin; Vit C		Only if signs and symptoms of deficiency (OMA 2016)
Selenium	**Insufficient evidence to support routine screening** (AACE/TOS/ASMBS 2013)	In patients with a malabsorptive bariatric surgical procedure (after RYBP & BPD/DS) who have unexplained anaemia (without iron deficiency) or fatigue, persistent diarrhea, unexplained cardiomyopathy, or metabolic bone disease (BOMSS 2014, Grade C; BEL 3 AACE/TOS/ASMBS 2013), Only if signs and symptoms of deficiency (cardiomyopathy (OMA 2016) Depending on clinical signs and kind of surgery (Grade C HAS 2009)
Zinc	After RYGD & BDP & BDP/DS (Farmaka 2016, Parretti 2015, BOMSS 2014, Grade C BEL 3 AACE/TOS/ASMBS 2013)	If anaemia without iron deficiency (Grade C BEL 3 AACE/TOS/ASMBS 2013) In patients with hair loss, pica, significant dysgeusia, acrodermatitis enteropathica-like, glossitis, or in male patients with hypogonadism or erectile dysfunction (OMA 2016, BOMSS 2014, Grade D AACE/TOS/ASMBS 2013) Optional (without detail) (Heber 2010)

Labs examination	Routine	Specific cases
		Depending on clinical signs and kind of surgery (Grade C HAS 2009)
Copper	After RYGD & BDP & BDP/DS (Parretti 2015, BOMSS 2014)	In patients with anaemia, neutropenia, myeloneuropathy, and impaired wound healing or difficulty walking, increased muscle tone or spasticity, and cardiomegaly (Grade D AACE/TOS/ASMBS 2013, OMA 2016, BOMSS 2014) If anaemia without iron deficiency (Grade C BEL 3 AACE/TOS/ASMBS 2013)
Magnesium	**Insufficient evidence to support routine screening** (BOMSS 2014) For all patients (SIGN 2010)	In patients with hypocalcaemia (BOMSS 2014)
Phosphorous	After RYGB, BPD or BPD/DS (1+++ Heber 2010)	
Fatty acid	**Insufficient evidence to support routine screening** (Grade D AACE/TOS/ASMBS 2013)	
Phosphate	SIGN 2010	

Malabsorptive bariatric surgical = RYGD & BDP & BDP/DS; SG = sleeve gastrectomy; RYGB = gastric bypass; BPD = biliopancreatic diversion; BPD/DS = biliopancreatic diversion with duodenal switch. CBC = complete blood count; PTH =intact parathyroid hormone; 24-H U-calcium = 24-hour urinary calcium
** IFSO-EC/EASO did not include sleeve in his publication.*

Despite difference between guidelines, consistency can be found about some routine labs tests that are indicated for all patients whatever the procedure of surgery i.e. complete blood count, iron/ferritin/transferrin, albumin/prealbumin, vitamin B12, vitamin D, Ca, PTH, plasma glucose, liver function tests, renal function.

For vitamin B9 (Folic acid), vitamin A, zinc and copper, assessment is recommended at least after BDP & BDP/DS. Some labs tests should not be routinely proposed i.e. vitamin B1, vitamin E, vitamin K, other vitamins, selenium and magnesium.

The **optimal timing** of the lab tests is difficult to be defined based on the literature but some trends can be mentioned: every 3-6 months during the first year and every 6-12 months the second year (and annually afterwards).

Of course some symptoms can also evoke a deficiency and justify an additional assessment. *For example, nutritional anaemias resulting from malabsorptive bariatric surgical procedures might involve deficiencies in vitamin B12, folate, protein, copper, selenium, and zinc and should be evaluated when routine screening for iron deficiency anaemia is negative (Ebpracticenet 2018, BOMSS 2014, Grade C; BEL 3 in AACE/TOS/ASMBS 2013)*[42, 54, 55]. A description of all clinical signs associated with nutritional deficiency is out of the scope of this chapter.

Table 18 – Summary of labs examinations in bariatric surgery (attention only based on publication with timing…)

Labs exams	Preoperative	Postoperative						
		1 month	3-4 months	6 months	12 months	18 months	24 months	Annually
Complete blood count, platelets	X Heber	X Heber X[1] IFSO-EC/EASO	X Heber, EASO X1 IFSO-EC/EASO	X Heber, EASO	X Heber, EASO X1IFSO-EC/EASO	X Heber X1 EASO	X Heber, EASO X1 IFSO-EC/EASO	X EBPRACTICE NET, EASO, Parretti, Heber X1 IFSO-EC/EASO
Coagulation profile: INR/Prothrombin time/Partial thromboplastin time		X[2] IFSO-EC/EASO	X[2] EASO, IFSO-EC/EASO	X[2] EASO	X[2] EASO, IFSO-EC/EASO	X[2] EASO	X[2] EASO, IFSO-EC/EASO	X[2] EASO, IFSO-EC/EASO
Iron, ferritine, transferrin, and total iron binding capacity)	X Heber	X2 IFSO-EC/EASO	X EASO , BOMSS, X2 IFSO-EC/EASO	X EASO BOMSS, X1 Heber	X EASO, BOMSS, X1 Heber X2 IFSO-EC/EASO	X1 Heber X2 EASO	X EASO, BOMSS, X1 Heber X2 IFSO-EC/EASO	X EASO, Parretti, BOMSS, X1 Heber X2 IFSO-EC/EASO
Albumin, prealbumin (in order to ensure a sufficient protein intake)	X Heber	X2 IFSO-EC/EASO	X2 EASO, IFSO-EC/EASO	X1 Heber X2 EASO	X1 Heber X2 EASO, IFSO-EC/EASO	X1 Heber X2 EASO	X1 Heber X2 EASO, IFSO-EC/EASO	X EBPRACTICE NET , IFSO-EC/EASO X1 Heber X2 EASO
Vit B1 (Thiamine)			O Heber	O Heber	O Heber	O Heber	O Heber	O Heber X[3] IFSO-EC/EASO
Vit B9 (Folic acid)	X Heber		X EASO, BOMSS,	X EASO, BOMSS, X1 Heber	X EASO, BOMSS, X1 Heber	X1 Heber X2 EASO	X EASO, BOMSS, X1 Heber	X EASO, Parretti, BOMSS, X1 Farmaka, Heber X[3] IFSO-EC/EASO

Labs exams	Preoperative				Postoperative			
Vit B12 (Cobalamin) (EASO, Heber)	X Heber	X2 IFSO-EC/EASO	X EASO X2 IFSO-EC/EASO	X EASO, BOMSS, X1 Heber	X EASO BOMSS, X1 Heber, IFSO-EC/EASO	X1 Heber X2 EASO	X EASO, BOMSS, X1 Heber, IFSO-EC/EASO	X EBPRACTICE NET , Farmaka, EASO, Parretti, BOMSS, X1 IFSO-EC/EASO , Heber
Vit D	X Heber	X2 IFSO-EC/EASO	X EASO, BOMSS, X2 IFSO-EC/EASO	X EASO, BOMSS, X1 Heber	X EASO, BOMSS, X1 Heber, IFSO-EC/EASO	X1 Heber X2 EASO	X EASO, BOMSS, X1 Heber, IFSO-EC/EASO	X EBPRACTICE NET, EASO, Parretti, BOMSS, X1 IFSO-EC/EASO, Farmaka, Heber
Calcium	X Heber	X2 IFSO-EC/EASO	X BOMSS, X2 IFSO-EC/EASO	X BOMSS, X1 Heber	X BOMSS, X1 Heber, IFSO-EC/EASO	X1 Heber	X BOMSS, X1 Heber, IFSO-EC/EASO	X Farmaka, Parretti, BOMSS X1 IFSO-EC/EASO , Heber
24-H U-calcium, osteocalcin			X1 EASO	X1 EASO	X1 EASO	X² EASO	X1 EASO	X1 EASO
Parathyroid hormone (PTH)	X Heber	X2 IFSO-EC/EASO	X EASO, BOMSS, X2 IFSO-EC/EASO	X EASO, BOMSS, X1 Heber	X EASO, BOMSS, X1 Heber, IFSO-EC/EASO	X1 Heber X2 EASO	X EASO, BOMSS, X1 Heber, IFSO-EC/EASO	X EASO, Parretti, BOMSS, X1 IFSO-EC/EASO, Farmaka, Heber
Bone alkaline phosphatase	X Heber				X1 Heber		X1 Heber	X1 Heber

Labs exams	Preoperative				Postoperative			
		X2 IFSO-EC/EASO	X2 IFSO-EC/EASO		X2 IFSO-EC/EASO		X2 IFSO-EC/EASO	X2 IFSO-EC/EASO
Phosphorous				X1 Heber	X1 Heber	X1 Heber	X1 Heber	X1 Heber
Vit A	X Heber		X² EASO	X2 EASO	X2 EASO	X2 EASO, BOMSS	O Heber X2 EASO, BOMSS	O Heber X1 Parretti X2 EASO, Farmaka, BOMSS
Vit E			X2 EASO	X2 EASO	X2 EASO	X2 EASO	X2 EASO	X2 EASO
Vit K								
Zinc (Heber)	X Heber			0 Heber	0 Heber X1 BOMSS		O Heber X1 BOMSS	O Heber X1 Farmaka, Parretti, BOMSS
Copper					X1 BOMSS		X1 BOMSS	X1 Parretti, BOMSS
Magnesium								
Plasma glucose **HbA1c if indicated (e.g. diabetes)**	X Heber	X Heber	X Heber	X Heber	X Heber	X Heber	X Heber	X EBPRACTICE NET, Heber, X³ IFSO-EC/EASO
Lipid level (& need for lipid-lowering medication) (Grade D)								O EBPRACTICE NET
Liver function tests (Heber)	X Heber	X Heber X2 IFSO-EC/EASO	X BOMSS, Heber X2 IFSO-EC/EASO	X BOMSS, Heber	X BOMSS, Heber X2 IFSO-EC/EASO	X Heber	X BOMSS, Heber X2 IFSO-EC/EASO	X IFSO-EC/EASO , Parretti, BOMSS, Heber

Labs exams	Preoperative		Postoperative					
								O EBPRACTICE NET
Electrolytes	X Heber	X Heber X2 IFSO-EC/EASO	X BOMSS, Heber, EASO X2 IFSO-EC/EASO	X BOMSS, Heber, EASO	X BOMSS, Heber, EASO X2 IFSO-EC/EASO	X Heber X2 EASO	X BOMSS, Heber, EASO X2 IFSO-EC/EASO	X EBPRACTICE NET, EASO, BOMSS, Heber
Creatinine	X Heber	X Heber X2 IFSO-EC/EASO	X Heber X2 IFSO-EC/EASO	X Heber	X Heber X2 IFSO-EC/EASO	X Heber	X Heber X2 IFSO-EC/EASO	X Heber O EBPRACTICE NET X2 IFSO-EC/EASO
Uree?			X BOMSS,	X BOMSS,	X BOMSS,		X BOMSS,	X BOMSS,

X = routine: O = optional; X[1] = Only after RYGB, BPD or BPD/DS; X[2] = Only after BPD or BPD/DS; X[3]= RYGP; IFSO-EC/EASO does not consider sleeve.

Key intervention 18

Routine monitoring of biochemical, hematological and metabolic changes is recommended following bariatric surgery to allow that nutritional supplementation is adjusted on an individualized basis (Strong). Regular assessment of complete blood count, iron/ferritin/transferrin, albumin/prealbumin, vitamin B12, vitamin D, Ca, PTH, plasma glucose, liver function tests and renal function should be proposed routinely whatever the type of surgical procedure (Weak). Patients who have undergone malabsorptive surgical procedure (i.e. RYGB, BPD and BPD/DS) should have vitamin B9 (folic acid), vitamin A, zinc and copper levels followed at least every 6 months (Weak).

4.6.1.5 Technical examinations

A dual-energy x-ray absorptiometry (DEXA) in order to monitor bone mineral density is the single technical examination proposed routinely after bariatric surgery by some guidelines (EASO 2017, O'Kane 2016, Grade D AACE/TOS/ASMBS 2013, Heber 2010)[38, 39, 42, 44]. It concerns mainly patients after RYGB, BDP or BDP/DS and can be performed bi-annually (AACE/TOS/ASMBS 2013)[42] or annually (Heber 2010)[39].

As shown in the Table 19, other technical examinations quoted in the literature are considered in specific cases.

Table 19 – Recommended technical examinations after bariatric surgery

Technical examination	Routine	Specific cases
Bone density measurements with use of axial (spine and hip) dual-energy x-ray absorptiometry (DEXA) to monitor for osteoporosis	For all patients (1+++ Heber 2010) In patients with RYGB, BPD, or BPD/DS (EASO 2017, O'Kane 2016, Grade D AACE/TOS/ASMBS 2013) At baseline and annually (Heber) or at about 2 years (AACE/ TOS/ASMBS 2013).	Mainly after a RYGB, if the patient has an important weight loss, if the serum vitamin D levels are low after the surgery or if the patient has additional risk factors for osteoporosis (Ebpracticenet 2018).
Upper GI endoscopy		Patients with clinical suspicion of leak (unexplained tachycardia, abdominal pain and peritonitis, fever…) or obstruction (ASMBS 2017). In the evaluation of celiac disease and bacterial overgrowth (Grade C; BEL3 AACE/TOS/ASMBS 2013). In cases of iron-deficiency anaemia (because it can be linked to an insufficient nutritional intake of iron but can also be due to an anastomotic leak) (Ebpracticenet 2018). For gastrointestinal symptoms suggestive of stricture or foreign body (e.g., suture, staple) as it can be both diagnostic and therapeutic (endoscopic dilation or foreign body removal) (Grade C; BEL 3 AACE/TOS/ASMBS). Evaluation can also include H pylori testing as a possible contributor to persistent gastrointestinal symptoms after bariatric surgery (Grade D AACE/TOS/ASMBS).
Abdominal and pelvic CT scan		Patients with clinical suspicion of leak (unexplained tachycardia, abdominal pain and peritonitis, fever…) or obstruction (ASMBS 2017). Patients with sudden onset, severe cramping periumbilical pain or recurrent episodes of severe abdominal pain any time after weight loss surgery to exclude the potentially life-threatening complication of a closed loop bowel obstruction (Grade D AACE/TOS/ASMBS 2013).
Colonoscopy		In order to detect a colorectal cancer if indicated (Ebpracticenet 2018).

Technical examination	Routine	Specific cases
Abdominal ultrasound		In order to evaluate patients with right upper quadrant pain for cholecystitis (Grade D AACE/TOS/ASMBS 2013).
Exploratory laparotomy or laparoscopy		In patients who are suspected of having an internal hernia because this complication can be missed with upper gastrointestinal (UGI) x-ray studies and CT scans (Grade C; BEL 3 AACE/TOS/ASMBS).

Key intervention 19

Dual-energy x-ray absorptiometry (DEXA) is the only technical examination that should be considered systematically, mainly after RYGB, BDP or BDP/DS and could be performed bi-annually (Weak). Other examinations can be prescribed based on an assessment of clinical symptoms or risk factors: Upper gastrointestinal endoscopy, abdominal and pelvic CT scan colonoscopy, abdominal ultrasound and exploratory laparotomy or laparoscopy (Weak).

4.6.2 Post-operative management programme

After bariatric surgery, several interventions are recommended to support a successful lifelong adjustment to the impact of the surgery. These interventions are part of a multidisciplinary approach and encompass behavioral modifications (including dietary changes and physical activity), but also if appropriate, pharmacologic therapy and/or surgical revision (4 D EASO 2017**,** Mc Grice 2015, Grade B; BEL 2 AACE/TOS/ASMBS 2013, 1+++ Heber 2010)[38, 39, 42, 51]. According to a review of low quality level, stepped care allowing a more personalized approach is needed to support weight loss after bariatric surgery. This stepped care starts with a minimal, low-intensity intervention. Afterwards components of increasing intensity are added for those who do not respond (Kalarchian 2018[67]).

These steps are the following:

- **The initial intervention should be self-weighing.** Behavioral self-regulation in general, and self-monitoring of weight specifically has been shown to be associated with improved weight outcomes (Kalarchian 2018, Mc Grice 2015)[51, 67]; **technology-enhanced scales** provided to the patient could support the self-weighing and allow the transmission of the weight measurements to the treatment team (Kalarchian 2018)[67].
- **For patients who reach a premature weight plateau or begin to regain weight,** an additional step is to combine self-weighing with **self-monitoring of diet** (e.g. frequently recording of their food intake) (Kalarchian 2018, Mc Grice 2015)[51, 67].
- **For patients with significant weight regain, an assessment of behavioral factors such as eating problems, alcohol, drugs, etc.** allows to identify potential targets for post-surgery counseling (Kalarchian 2018)[67]; if patients do not need counseling for an identified problem, more intensive strategies can be proposed (e.g. provision of **home exercise equipment or portion-controlled foods**, adapted to the unique needs of this patient population (Kalarchian 2018)[67].

- **Patients who are unable to lose weight or maintain weight loss** can be candidates for **medication** (if possible before weight regain and with topiramate, the only one that demonstrated a significant effect) (Kalarchian 2018)[67].
- Finally, some patients with inadequate weight loss and weight regain can be candidate for **revisional surgery after a comprehensive assessment (including both medical and behavioral education)** (Kalarchian 2018)[67].

However the authors of this review highlights this stepped care approach for weight management after bariatric surgery should be assessed by further studies (Kalarchian 2018)[67].

Key intervention 20

After bariatric surgery, several interventions are recommended to support a successful lifelong adjustment to the consequences of the surgery. These interventions are part of a multidisciplinary approach and encompass behavioral modifications (including dietary changes and physical activity), but also if appropriate, pharmacologic therapy and/or surgical revision (Strong). A stepped care approach starting with a minimal, low-intensity intervention and proposing components of increasing intensity in case of poor outcome is suggested (GPP).

4.6.2.1 Patient education for weight management

Because behavioral changes are needed to optimize weight after surgery (3 D EASO 2017)[38], providing practical knowledge, skills and support to the patients is considered as important (Mc Grice 2015)[51].

Some tips, based on very low quality evidence, can be proposed:

- The education sessions started **in pre-operative period** should be continued in **post-operative** (Mc Grice 2015, NICE 2014, GPP HAS 2009)[16, 40, 51].
- **Self-management education** should support patient's empowerment and help patients to make decisions about their care (e.g. to ask for more support when needed) (Funnell 2005)[59].
- Bariatric education should be delivered by a **multidisciplinary team** of health professionals (Mc Grice 2015)[51].
- A minimum of **12 consultations** within the first 6 months of surgery achieved better weight loss results (Mc Grice 2015)[51].
- **Self-monitoring** including regular weigh-ins, food records (e.g. in a daily food intake journal) and exercise diaries are mentioned as important tools for avoiding weight regain (Kalarchian 2018, Mc Grice 2015)[51, 67]. These tools can increase the patient's involvement and awareness regarding his/her behavioural changes and allow the team to identify any high-risk areas (e.g. nutritional adequacy) (Kalarchian 2018, Mc Grice 2015)[51, 67].
- **Digital communication methods** such as social media, telephone consultations and online education programmes could support the patients' involvement (by minimizing barriers such as time, distance and cost) (Mc Grice 2015, Funnell 2005)[51, 59].
- Attendance and participation in **bariatric support groups** can make after-care easier and more efficient for both patients and surgeons (Grade C IFSO-EC/EASO 2017, Sogg 2016, NICE 2014, Grade B; BEL 2 for AACE/TOS/ASMBS 2013, Funnell 2005)[16, 42, 46, 48, 59].
- Education programme should be **adapted to each patient** (Agnetti 2011)[47]; using patient experience (with behavioural experiment, goal setting in a five-step process[t]) within support group helps to

[t] Five steps for the patients are: Explore their problems; Clarify their beliefs, thoughts and feelings that may support or hinder their efforts; Identify long-term goals (if possible on one area to concentrate); Commit to making behavioural changes; Evaluate their efforts and identify what they learned in the process.

individualize the programme to ensure that the content provided is relevant for the needs of the group (Funnell 2005)[59].

- Rather than beginning by a review of the patients' diet, exercise and weights, it is more patient's centred to **ask them how they are feeling** (psychologically as well as physically) and how they believe that they are doing in reaching their self-selected goals and caring for themselves (Funnell 2005)[59].

Key intervention 21

Education sessions providing practical knowledge, skills and support to the patients is considered as important after bariatric surgery because behavioural changes are needed to optimize weight after the intervention (GPP). It is suggested that these education sessions are provided by a multidisciplinary team, start in the preoperative phase and be continued in the postoperative period (GPP). Some suggestions are proposed to increase the patient's empowerment and involvement such as self-monitoring of weight, food and physical activity, digital communication tool or participation to support groups (GPP).

4.6.2.2 Nutritional counselling

The need and usefulness of routine nutritional counselling after bariatric surgery is not questioned in the literature (NICE 2014, GPP SIGN 2010)[16, 43]. This contributes to the decreasing readmissions (secondary to dehydration and malnutrition) and may improve postoperative outcomes such as weight loss and metabolic goals (ASMBS 2017)[45].

The level of support required can **vary between patients** (O'Kane 2016, Agnetti 2011)[44, 47] and may also be influenced by the **surgical procedure** (O'Kane 2016)[44].

However, there is a lack of publications on the dietician aspect of the bariatric patient management post-operative phase (Agnetti 2011)[47] and many recommendations are based on consensus rather than on high level evidence. One important aspect mentioned is that whatever the discipline of the healthcare professional (dietician/nutritionist, surgeon, etc.) involved in this aspect, he/she should be familiar with the post-operative bariatric diet (O'Kane 2016, Mancini 2014)[44, 58].

Based on the included publications, the nutritional consultation can encompass:

- Explanation (and adhesion) of the principles of **healthy eating** with specific advices (1A EASO 2017)[38]:
  - **Progression through four diet phases** (GPP Agnetti 2011)[47]**,** during a 6 to 8 week period (ASMBS 2017)[45]. These 4 phases are: liquid (up to 1 week), purred[u] (2 to 4 weeks), soft solid (progress as tolerated) and firmer, regular foods (maintenance) (Mingrone 2018, ASMBS 2017)[45, 52]. The surgeon, nutritionist or registered dietician (RD) may decide to progress the diet sooner based on the individual's needs and tolerances (ASMBS 2017, Ebpracticenet 2018)[45, 55]. Pureed foods should be temporary because they do not produce adequate satiety and can jeopardize weight loss (Mc Grice 2015)[51].

    This gradual progression of food consistency is particularly recommended after procedures with a gastric component to allow patients to adjust to a restrictive meal plan and to minimize vomiting which can damage surgical anastomoses or lead to gastroesophageal reflux (1+++ Heber 2010)[39].
  - **Three to five small meals a day.** This splitting of meals aims to ensure a better gastric tolerance while allowing the coverage of nutritional needs. (Mingrone 2018, OMA 2016, AACE/TOS/ASMBS

[u] régime à base de semi-liquides et d'aliments à consistance molle (par exemple : jus de fruit, bouillon, purée de fruit, yaourt gruau, bouillie, banane, poisson cuit au four, pain de viande). (Ebpracticenet 2018)[55]

2013, GPP Agnetti 2011)[42, 47, 52, 57]; Patients should also be informed that an excessive number and size of meals and/or grazing will probably result in lower weight loss (EASO 2017, IFSO-EC/EASO 2017, Mc Grice 2015)[38],[48, 51].

- **Chewing small bites** of food thoroughly before swallowing and eating slowly (Ebpracticenet 2018, OMA 2016, Mancini 2014, AACE/TOS/ASMBS 2013, Grade C Agnetti 2011)[42, 47, 55, 57].
- **Eating in a relaxed manner, avoiding distractions** (e.g. television, work or reading) (Mc Grice 2015, Grade C Agnetti 2011)[47, 51]. Patients should be attuned to their body's signals for determining when to stop eating for example (Mc Grice 2015)[51].
- **Avoidance of concentrated sweets** to minimize dumping syndrome (especially after RYGB) and to reduce caloric intake after any bariatric procedure (IFSO-EC/EASO 2017, OMA 2016, Mancini 2014, Grade D AACE/TOS/ASMBS 2013)[57],[42, 48].
- Measures to **expand the low-fibre diet** followed during the first month after surgery for RYGB and sleeve (Grade C Agnetti 2011)[47].

- Consumption of **liquids in satisfactory volumes** to sustain satisfactory hydratation (1500 - 2 000 ml daily) (Ebpracticenet 2018, Mancini 2014, GPP HAS 2009)[40, 55, 58]:
  - **Consuming liquids slowly**, at least 30 minutes after meals to avoid gastrointestinal complaints (Mingrone 2018, OMA 2016, Mancini 2014, AACE/TOS/ASMBS 2013, Grade C Agnetti 2011)[42, 47, 52, 57, 58].
  - **Avoidance of carbonated beverage** to avoid gastric expansion (Grade C Agnetti 2011)[47].
  - **Avoidance of high calorie liquid** such as milkshakes, smoothies, juices (Mc Grice 2015, GPP Agnetti 2011)[47, 51].
- Nutritional counselling about the **problem of protein intake**:
  - This counselling seems particularly important in the first months after surgery. A sufficient protein intake is indeed needed to reduce the risk of **lean body mass loss** when a rapid weight loss occurs (EASO 2017, IFSO-EC/EASO 2017, Mc Grice 2015)[38],[48, 51].
  - This also important in those treated with **malabsorptive procedures** to prevent protein malnutrition and its effects (Heber 2010)[39].
  - There is **no standard recommendation** on protein intake after bariatric surgery. The average recommended protein intake is 0.8 g/kg of bodyweight (Mingrone 2018, Agnetti 2011)[47, 52] or 60-120 g/day (4D EASO 2017, IFSO-EC/EASO 2017, ASMBS 2017, Ebpracticenet 2018, Heber 2010 1+++)[38],[39, 45, 48, 55]. This can reach up to 1.5 g/kg ideal body weight per day (4D EASO 2017, ASMBS 2017, Mancini 2014)[38, 45, 58] or even up to 2.1 g/kg ideal body weight per day, on an individualized basis (EASO 2017, OMA 2016, AACE/TOS/ASMBS 2013)[38, 42, 57].
  - Because calculating the recommended dietary protein intake is difficult, a compromise is to suggest the patient to eat **approximately 90 g of protein per day** when their bodyweight exceeds 100 kg and to ask them to eat the protein first to ensure they do not reach satiation before eating the protein components of their meals.
  - In the first period after surgery, many programmes use **liquid protein supplements** (30 g/day) until the patient is able to take in enough food sources of protein to meet the daily needs (4D EASO 2017, ASMBS 2017, Mingrone 2018)[38, 45, 52].
- Advices regarding the **daily life** (e.g. meals with friends or at restaurant, preparing food) (Mc Grice 2015, Agnetti 2011)[47, 51].
- Management of **digestive intolerances**, often linked to lack of adherence to dietary recommendations such as insufficient chewing, large swallowing, quick eating, etc. (GPP Agnetti 2011)[47].

It is also suggested to propose to the patient a **nutritional diaries** (Agnetti 2011)[47] and to use a **standardized registry of patient's data** (Agnetti 2011)[47].

Key intervention 22

It is proposed that bariatric patients receive regular nutritional counselling by a dietician with expertise in bariatric surgery care or a trained health professional about long-term dietary modifications (GPP). The focus of dietary counselling should be the adaptation of patients eating and drinking behaviour to the changed needs after surgery (Weak). An appropriate protein intake (min 60g/d) seems particularly important in the first months after bariatric surgery (Weak). Advice regarding daily life and management of digestive intolerances are other considered issues (GPP). It is also suggested to propose to the patient to use a nutritional diary and to use a standardized registry of patient's data (GPP).

4.6.2.3 Vitamin & mineral supplementation

The need for long-term multivitamin and mineral supplementation after bariatric surgery is mentioned by several guidelines (3D EASO 2017, NICE 2014, Heber 2010 1+++, SIGN 2010)[16, 38, 39, 43]. However, **modalities differ** between authors, according to the type of bariatric surgery (with potentially more extensive replacement therapy after **malabsorptive procedures** (Heber 2010))[39], certain **risk factors** (e.g. frequent vomiting or poor patient compliance) (Mc Grice 2015)[51] or the **results of periodic laboratory surveillance** for nutritional deficiencies (Mingrone 2018, EASO 2017, IFSO-EC/EASO 2017, Ebpracticenet 2018, Mc Grice 2015, Mancini 2014, AACE/TOS/ASMBS 2013, Heber 2010, HAS 2009)[38, 58, 39, 40, 42, 48, 51, 52, 55] (see Table 20).

Based on at least one publication of high quality, it appears that multivitamin and mineral supplementation should contain at minimum **vitamin B1 (thiamin), vitamin B9 (folic acid), vitamin D, calcium, iron, selenium, copper and zinc**. As showed in the Table 20, there is more discussion about vitamins A and vitamin B12. Other vitamins are rarely mentioned (only by OMA 2016)[57].

Multivitamin and mineral supplements contain usually the recommended elements but they may **not contain sufficient amounts** of certain vitamins or minerals and trace elements (e.g. they can contain only 1 mg copper instead of the recommended 2 mg)[v] (BOMSS 2014)[54].

Chewable or liquid formulations are used initially (e.g. 3 to 6 months) because more easily absorbed (Mingrone 2018, AACE/TOS/ASMBS 2013)[42, 52].

The role of diet is highlighted and patients should be encouraged to have **dietary sources** of for examples folic acid, calcium, vitamin D, selenium (BOMSS 2014)[54].

Moreover, little is known about the **long-term adherence of patients** to vitamin and mineral supplementation regimens (Mingrone 2018)[52].

[v] Some authors recommend multivitamin and micronutrient supplement specifically developed for post-metabolic bariatric surgery (like Fit-for-me, WLS forte…), while some other just advice to take a double dose of a non-specified multivitamin (double dose compared to what non- metabolic bariatric surgery people could take)

Table 20 – Vitamins and mineral after bariatric surgery

Supplementation	Routine	Specific cases
Vit B1 (Thiamine)	For all bariatric patients, oral thiamine supplementation should be included as part of routine multivitamin with mineral preparation (Mingrone 2018, BOMSS 2014, Grade D AACE/TOS/ASMBS 2013) With 3 mg as usual dose (Mingrone 2018)	Additional intravenous thiamine supplementation: 100 mg/d IV for 7 days, then 50 mg/d until normal range : • if persistent vomiting severe enough to interfere with regular nutrition, even in the absence or before confirmatory laboratory data. (Ebpracticenet 2018, Grade 4D EASO 2017 and not specifically in IV, OMA 2016, Grade C BEL3 AACE/TOS/ASMBS 2013, Grade C HAS 2009) • if surgery complication with parenteral nutrition or fast weight loss (Grade C HAS 2009) • In patients with rapid weight loss, poor dietary intake, protracted vomiting, parenteral nutrition, excessive alcohol use, neuropathy or encephalopathy, oedema or heart failure (Grade D AACE/TOS/ASMBS 2013) Additional thiamine supplementation: 200-300 mg/d + Vit B co-strong 1 or 2 tablets, 3 times a day) and urgent referral to bariatric centre. • if risk of Wernicke encephalopathy such as those with prolonged vomiting, poor nutritional intake, high alcohol intake or fast weight loss (BOMSS 2014) If severe deficiency, intravenous thiamine (e.g. 500 mg/d IV for 3 to 5 days, then 250 mg/d for 3 to 5 days or until resolution of symptoms, and then 100 mg/d, orally, usually indefinitely or until risk factors have resolved) (Grade C BEL 3 AACE/TOS/ASMBS).
Vit B9 (Folic acid)	For all bariatric patients, as part of routine multivitamin with mineral preparation (Mingrone 2018, OMA 2016, BOMSS 2014, Grade B, BEL 2 for AACE/TOS/ASMBS 2013) Even if folate deficiency is uncommon after bariatric surgery because folate absorption occurs throughout the entire small bowel (EASO 2017). Especially in menstruating women of childbearing potential (OMA 2016, Grade A, BEL1 for AACE/TOS/ASMBS 2013) With daily multivitamin 400 µg of folic acid (OMA 2016, Grade B, BEL 2 for AACE/TOS/ASMBS 2013) or 500-800 µg (Mingrone 2018).	Additional folic acid (5 mg) • If preconception • If pregnancy during the first 12 weeks (BOMSS 2014, HAS 2009 Grade C) If daily multivitamin has 400 µg of folic acid, then replacement dose for deficiency is an additional 800 ug/d orally (total of 1200 ug/d of folic acid until normal range, and then a multivitamin with at least 400 ug/d of folic acid (OMA 2016) Additional folic acid if deficiency ONLY after check for compliance and for vit B12 deficiency as folic acid supplementation in severe vit B12 depletion may lead to neurological complications (BOMSS 2014) • If megaloblastic, macrocytic anemia

Supplementation	Routine	Specific cases
Vit B12 (Cobalamin)	After gastric bypass, sleeve gastrectomy & BPD/DS (Mingrone 2018) EASO 2017, BOMSS 2014) but is rare in the first year after surgery because stores are high); After Sleeve* (ASMBS 2017) After gastric bypass & sleeve as needed to maintain B12 levels in the normal range (Grade B BEL 2 AACE/TOS/ASMBS) After malabsorptive surgery (Grade C HAS 2009) For all kind of surgery (OMA 2016) With : • Orally (tablet or sublingual) 350-500 µg/d (EASO 2017, OMA 2016); 500 µg/d for sleeve & BPD/DS (Mingrone 2018)	Additional supplementation, in case of deficiency e.g. If megaloblastic, macrocytic anaemia, neurologic symptoms), until B12 in normal range (EASO 2017, Ebpracticenet 2018, BOMSS 2014): • Orally 1 mg 2–3 times/week or /day (Ebpracticenet 2018, ASMBS 2016) or 350-500 ug/d (OMA 2016) • Sublingually 1 mg/wk (OMA 2016) • IM 1 mg/mo (OMA 2016) or 1 mg/ 3–4 months (Ebpracticenet 2018, BOMSS 2014) or even less frequent in for sleeve surgery (BOMSS 2014) • Orally 1 mg/d or more (Grade A BEL 1 AACE/TOS/ASMBS 2013); fpr RYGB (Mingrone 2018) • Intranasally 500 µg/week (EASO 2017, GRADE D AACE/TOS/ASMBS) IM or subcutaneous 1 mg/mo to 1-3 mg every 6 to 12 months (EASO 2017, OMA 2016) if B12 sufficiency cannot be maintained using oral or intranasal routes (Grade C BEL 3 AACE/TOS/ASMBS 2013) Emphasis should be made for bariatric surgery patients with high cardiovascular risk (patients on proton pump inhibitors or metformin as well as vegetarians) regarding prevention of vitamin B12 deficiency by regular parenteral vitamin B12 injections. (GRADE D O'Kane 2016)
Vitamins A, E, K,	For all as part of routine multivitamin with mineral preparation (OMA 2016, BOMSS 2014) Only for all BPD/DS patients because the absorption of any fat-soluble vitamin (A, E, K) is reduced after bariatric procedures causing fat malabsorption and steatorrhoea. (Mingrone 2018, EASO 2017). With a dose of 4000-5000 IU vitamin A, 400 IU vitamin E and 4 mg vitamin K (Mingrone 2018)	Oral diet and routine supplementation with multivitamins and minerals is usually sufficient to prevent clinical problems (OMA 2016, BOMSS 2014). Potential additional requirements for Vitamin A (and for Vitamin E & K) for gastric bypass or BPD/DS patients (BOMSS 2014) for BPD & BPD/DS (Grade C BEL 3 AACE/TOS/ASMBS 2013) In cases of **vitamin A** deficiency: • If corneal keratinization, ulceration or necrosis: 50-100,000 IU IM for 3 days, followed by IU IM for 2 weeks • If no corneal changes: 10-25,000 IU orally for 1-2 weeks • Further treatment depends on persistent malabsorptive effects, as may most be a concern with BPD/DS (OMA 2016)

Supplementation	Routine	Specific cases
		A typical dose to treat **vitamin E** deficiency is 400 to 800 IU/d orally (OMA 2016) For **vitamin K**, oral or IM supplement when INR values rise 1.4 (common in BPD & BPD/DS (Heber 2010). If **vitamin K** deficiency occurs during substantial gastrointestinal malabsorption, then vitamin K can be replaced 10 mg by slow IV. Otherwise, typical oral replacement dose is 300 ug/d. Continued treatment depends on persistent malabsorptive effects, as may most be a concern with biliopancreatic diversion/duodenal switch.(OMA 2016)

Vit D	After gastric bypass, sleeve gastrectomy & BPD/DS (EASO 2017, BOMSS 2014); After Sleeve* (ASMBS 2017)
	
	After gastric bypass & BPD/DS (Grade C BEL 3 AACE/TOS/ASMBS 2013)
	
	After malabsorptive surgery (1+++ Heber 2010, Grade C HAS 2009)
	
	After BPD/DS (Mingrone 2018)
	
	For all kind of surgery (Ebpracticenet 2018, OMA 2016, SIGN 2010)
	
	With oral vitamin D3 3000 IU/d (EASO 2017 but quoted also 400-800 U/d); 800 IU (20 µg)/d. (BOMSS 2014, SIGN 2010)
	
	With oral vitamin D3 3000-5000 IU for bypass and sleeve gastrectomy (Mingrone 2018) but 100 000 IU in a single IM dose once per month for BPD/DS (Mingrone 2018).
	
	(titrated to therapeutic 25-hydroxyvitamin D levels >30 ng/ml)
		Additional supplementation if mild deficiencies
		
		• 1000 IU/d of Vit D3 after gastric bypass and 2000 IU/d after BPD/DS (OMA 2016)
		
		Additional supplementation if severe deficiency
		
		• Up to 300,000 IU of Vit D2 or D3 as weekly or daily split doses
		  ○ 50,000 IU capsules, 1 weekly for 6 wks
		  ○ 20,000 IU capsules, 2 weekly for 7 wks
		  ○ 800 IU capsules, 5/d for 10 wks
		• Then between 800 up to 2000 IU daily (or higher e.g. 3000 IU if still with substantial malabsorptive signs and symptoms) (OMA 2016, BOMSS 2014)
		• 50,000 IU of Vit D2 or D3 1 to 3 times weekly to daily and more recalcitrant cases may require concurrent oral administration of calcitriol (1,25-dihydroxyvitamin D) (Grade D AACE/TOS/ASMBS 2013)

Calcium	For all kind of surgery (Mingrone 2018, Ebpracticenet 2018, OMA 2016, SIGN 2010); After Sleeve* (ASMBS 2017) After gastric bypass, sleeve gastrectomy & BPD/DS (BOMSS 2014)	Calcium should be taken at least 1 hour apart (OMA 2016), preferably 2-4 hours (BOMSS 2014, ASMBS 2013) from other supplements, especially iron.

Supplementation	Routine	Specific cases
	After by-pass & BPD/DS (EASO 2017, Grade C BEL 3 AACE/TOS/ASMBS 2013) After malabsorptive surgery (1+++, Heber 2010, Grade C HAS 2009) With calcium citrate 1200-2000 mg/d (Mingrone 2018, EASO 2017, OMA 2016); at least 800-1200 mg/d (BOMSS 2014) In addition to vitamin D (EASO 2017, OMA 2016, AACE/TOS/ASMBS 2013) Calcium citrate should be preferred to calcium carbonate because it is better absorbed in the absence of gastric acid (EASO 2017).	
Iron	For all bariatric patients, as part of routine multivitamin with mineral preparation (Mingrone 2018, EASO 2017, OMA 2016, BOMSS 2014, Grade B, BEL 2 AACE/TOS/ASMBS 2013); After Sleeve* (ASMBS 2017) After malabsorptive surgery (Grade C HAS 2009) Minimum iron supplementation should be 18 mg/d (OMA 2016) or at least 27 mg of elemental iron daily (EASO 2017) or between 45-60 mg (BOMSS 2014) or 150-200 mg as elemental iron (Mingrone 2018, Grade A Bel 1 AACE/TOS/ASMBS 2013). which may be more effective with vitamin C supplementation (BOMSS 2014, Grade C BEL 3 AACE/TOS/ASMBS 2013) with 500 mg/d vit C (EASO 2017, OMA 2016) or alongside citrus fruits / drinks (BOMSS 2014) Especially among menstruating women of childbearing potential (EASO 2017, OMA 2016)	Additional iron is recommended : • After sleeve gastrectomy, gastric bypass and BPD/DS (BOMSS 2014). This may be achieved with 200 mg ferrous sulphate, 210 mg ferrous fumarate or 300 mg ferrous gluconate daily in addition to the multivitamin and mineral supplement (BOMSS 2014). • For women of reproductive age who are menstruating: at least 100 mg elemental iron daily (two ferrous sulphate or ferrous fumarate daily). (BOMSS 2014). • For moderate deficiency, menstruating women, or patients at risk for iron deficiency anemia, total elemental iron intake (including in a multivitamin) should be 50-100 mg/d (OMA 2016) • For severe deficiency, IV iron is sometimes required, which is provided in multiple different formulations, some of which require test doses (OMA 2016, Grade D AACE/TOS/ASMBS 2013) Calcium should be taken at least 1 hour apart (OMA 2016), preferably 2-4 hours (BOMSS 2014, ASMBS 2013) from other supplements, especially iron. Often iron needs to be given parenterally once or twice a year depending on plasma iron and haemoglobin concentration (Mingrone 2018)

Supplementation	Routine	Specific cases
Copper	For all as part of routine multivitamin with mineral preparation (EASO 2017, OMA 2016, BOMSS 2014, GRADE D AACE/TOS/ASMBS 2013); After Sleeve* (ASMBS 2017) With 2 mg/d of copper (BOMSS 2014)	Potential additional requirements for gastric bypass or BPD/DS patients (double dose) (BOMSS 2014) In severe deficiency, treatment can be initiated with IV copper (2 to 4 mg/d) X 6 days (Grade D). Subsequent treatment or treatment of mild to moderate deficiency can usually be achieved with oral copper sulfate or gluconate 3 to 8 mg/d until levels normalize and symptoms resolve (Grade D AACE/TOS/ASMBS 2013) In patients being treated for zinc deficiency or using supplemental zinc for hair loss, zinc consumption may impair copper absorption, thus 1 mg of copper should be given per each 10 mg of zinc (OMA 2016) or 8-15 mg of zinc (BOMSS 2014, Grade C; BEL 3 AACE/TOS/ASMBS 2013) administered.
Zinc, selenium	For all as part of routine multivitamin with mineral preparation (Mingrone 2018, EASO 2017, OMA 2016, BOMSS 2014); After Sleeve* (ASMBS 2017) After BDP &BDP/DS (Grade C, BEL 3 AACE/TOS/ASMBS 2013). With usual 15 mg of zinc (Mingrone 2018, BOMSS 2014)	Oral diet and routine supplementation with multivitamins and minerals is usually sufficient to prevent clinical problems (OMA 2016, BOMSS 2014) Potential additional requirements of zinc (double dose) and for selenium for gastric bypass or BPD/DS patients (BOMSS 2014) If higher doses of single trace elements are needed, timing of administration of these micronutrients should be considered due to the possible interference between elements for intestinal absorption (zinc and iron in particular) (EASO 2017). A typical replacement dose for zinc deficiency is 60 mg of elemental zinc twice daily (OMA 2016) Once zinc is in normal range, if malabsorption remains a risk, a typical supplemental dose is zinc 30 mg/d (OMA 2016). Zinc consumption may impair copper absorption, thus 1 mg of copper should be given per each 10 mg of zinc (OMA 2016) or 8-15 mg of zinc (BOMSS 2014, Grade C BEL 3 AACE/TOS/ASMBS 2013) administered.

**ASMBS focused only on sleeve and did not mention other bariatric surgeries.*

Key intervention 23

Long-term vitamin and mineral supplementation is recommended in all patients undergoing bariatric surgery (Strong). Potentially more extensive replacement therapy is needed for patients who have had malabsorptive procedures or have some risk factors (GPP).

Minimal daily nutritional supplementation for patients, in chewable form initially (i.e., 3 to 6 months), should include at least vitamin B1 (thiamin) (Weak), vitamin B9 (folic acid) (Strong), vitamin D (Weak), calcium (Weak), iron (Strong), copper (Weak), zinc (Weak) and selenium (Weak). This supplementation should also contain vitamin A and vitamin B12 after malabsorptive surgery (weak).

Additional supplementation is required according to the results of periodic laboratory surveillance for nutritional deficiencies (Weak).

The role of the diet is also highlighted and patients can be encouraged to have dietary sources of micronutriments (GPP).

4.6.2.4 Psychological support

Access to **psychological support** is often recommended in the months following surgery (IFSO-EC/EASO 2017, NICE 2014, SIGN 2010)[16, 43, 48] and can be needed for different reasons:

- To help patients in the process of psychological reorganization related to body modification (Lamore 2017, GPP HAS 2009)[40, 64]. Even if the surgery may incur psychological benefits (e.g., positive well-being) and may improve quality of life, some patients may have to deal with body image problems and can have trouble adjusting to their new eating habits (Lamore 2017, Welbourn 2016)[56, 64].
- To continue the management for identified patients in the preoperative phase because they have eating disorders (Grade C HAS 2009)[40] or psychiatric pathologies (HAS 2009)[40]
- To support patients who are struggling psychologically, experience alcohol and substance use disorders or have an increased risk of suicide after bariatric surgery (Welbourn 2018, Lamore 2017, Grade D O'Kane 2016, BOMSS 2014)[41, 44, 54, 64].

In practice however, this **follow-up appears not to be systematized**, psychological resources focus on pre-operative assessment rather on post-operative consultation and clear recommendations after surgery are missing (Lamore 2017)[64]. For example, there are little details in the selected literature on the public target, the timing, the content, etc. of the psychological support. The professionals involved are not specified but **access to a clinical psychologist or psychiatrist** (for high risk patients) has to be considered. A concertation with the MDT team is mentioned if the psychological support is performed by an external psychologist or psychiatrist (GPP HAS 2009)[40].

Key intervention 24

Support to patients' mental health and psychosocial needs should be provided and continued after bariatric surgery with adequate access to a clinical psychologist or a psychiatry professional when appropriate. A concertation with the MDT team is needed, with a particular attention if the psychological support is performed by an external psychologist or psychiatrist (GPP). The psychological support can help patients in the process of psychological reorganization related to significant body image disturbance after surgery, continue previous management of eating or psychiatric disorders, and support patients more vulnerable for developing depressive illness, post-operative alcohol/substance use disorders and risk of suicide (GPP).

4.6.2.5 *Promotion of physical activity*

Regular physical activity is advised by several guidelines (1A EASO 2017, IFSO-EC/EASO 2017, Mc Grice 2015, BOMSS 2014, NICE 2014, AACE/TOS/ASMBS 2013, Agnetti 2011, Heber 2010, GPP SIGN 2010, HAS 2009)[38, 47,16, 39, 40, 42, 43, 48, 51, 54]. It is argued that it is linked to the amount of weight loss after the surgery and it is a critical factor for preventing muscle loss (EASO 2017)[38].

The rhythm and duration of activities is not consistent among the authors. Several authors advise that patients incorporate **a minimum of 150 min/week of moderate aerobic physical activity** (2+ SIGN 2010)[43] and aim for **300 min/week, including endurance and gradually strength training 2–3 times per week** (Mingrone 2018, 1A EASO 2017, BASO 2016, Grade A BEL1 AACE/TOS/ASMBS 2013)[38, 42, 52, 65]; other authors evoke a **minimum of 60 minutes of moderate to vigorous intensity physical activity daily** (in one block or separated) (Mc Grice 2015)[51].

One guideline specifies that this physical activity should **start 6 weeks after surgery** (BASO 2016)[65] in contrast with others advising to begin physical activity **immediately after the intervention** (1A EASO 2017 or at least in the short term after surgery for AACE/TOS/ASMBS 2013)[38, 42].

To encourage patients, **some strategies** are proposed such as:

- Referral to specialist physiotherapy (GRADE D O'Kane 2016)[44].
- Referral to specialist exercise programmes (Grade D O'Kane 2016)[44] or enrolling patients in exercise programmes (opinion AACE/TOS/ASMBS 2013)[42].
- Classes as a group (Brizell 2012)[68].
- Use of exercise diaries (Mc Grice 2015)[51].

Key intervention 25

Physical activity has to be encouraged after bariatric surgery, starting immediately (or at least in the short term) after the recovery from surgery (Strong). Patients should be advised to incorporate moderate aerobic physical activity to include a minimum of 150 min/week. Yet it is advised to aim 300 min/week, as well as to undertake 2–3 times per week endurance and gradually strength training (Weak). Some strategies are suggested to support the patient commitment in physical exercise such as referral to specialist physiotherapy, exercises programmes, group session or use of an exercise diary (GPP).

4.6.2.6 *Substance abuse management*

Two guidelines formulated recommendations on substance abuse after bariatric surgery.

- **Tobacco** use should be avoided after bariatric surgery given the increased risk for of poor wound healing, anastomotic ulcer, and overall impaired health (Grade A BEL 1 for AACE/TOS/ASMBS 2013)[42].
- **Alcohol use should be limited** because it is a high-calorie liquid owing to excess caloric intake but also because the alcohol metabolism may be altered after RYGB, causing patients to become intoxicated more quickly with less alcohol and at increased risk for dependency (Mc Grice 2015)[51]. Following RYGB, high-risk groups should eliminate alcohol consumption due to impaired alcohol metabolism causing patients to become intoxicated more quickly with less alcohol and at risk for dependency (Grade C BEL 3 for AACE/TOS/ASMBS 2013)[42].

Key intervention 26

- **Tobacco use has to be avoided after bariatric surgery given the increased risk for poor wound healing, anastomotic ulcer, and overall impaired health (Strong);**
- **Alcohol use should be limited after bariatric surgery because it leads to excess caloric intake and should be avoided after RYGB due to impaired alcohol metabolism and risk of alcohol use disorders postoperatively (Weak).**

4.6.2.7 Adaptation of medication

Several authors highlight that, after bariatric surgery, the management of medications may need to be modified (Mingrone 2018, EASO 2017, IFSO-EC/EASO 2017, O'Kane 2016, Mancini 2014, AACE/TOS/ASMBS 2013, GPP HAS 2009)[38, 58,40, 42, 44, 48, 52]. Several reasons explain this statement. The substantial anatomical and physiological changes in the gastrointestinal tract may affect the drug pharmacokinetics (mainly absorption of drugs but also tissue distribution, drug metabolism and elimination). Moreover, weight loss may have an effect on bioavailability of the drugs (EASO 2017)[38].

This implies different actions:

- **Ongoing treatments should be suitably adapted. For examples:**
  - Patients with Type 1 DM may need to reduce doses of **insulin** due to improved insulin sensitivity (Ebpracticenet 2018, Grade D O'Kane 2016)[44, 55].
  - **Anti-diabetics drugs** with a high risk of hypoglycaemia, such as sulfonylureas and glinides, should be discontinued (Mingrone 2018)[52], in the first 7-10 days after surgery (3D EASO 2017)[38].
  - **Metformin** should be continued (until prolonged clinical resolution of diabetes is demonstrated by normalized glycaemic targets (Grade D AACE/TOS/ASMBS 2013)[42] and unless contraindicated. (GRADE D O'Kane 2016)[44] but metformin doses may need be reduced due to increased absorption (3D EASO 2017)[38].
  - Patients on **anti-coagulants**, e.-g. warfarin, low molecular heparin, should be managed by the bariatric MDT in conjunction with the anti-coagulation team, especially patients with a duodenal switch who are more likely to develop fat soluble vitamin deficiencies (GRADE D O'Kane 2016)[44].
  - Patients with pre-existing mental health conditions may need medication reviews (Grade C O'Kane 2016)[44]. Special attention should be paid to drugs such **carbamazepine, phenytoin and selegiline,** that require acidic environment or food in order to be adequately absorbed (EASO 2017)[38].
  - Doses of substances that may be poorly absorbed following malabsorptive surgery should be adapted (for example, **antivitamin K, thyroid hormones**, etc.) (GPP HAS 2009)[40].
  - The effect of weight loss on **dyslipidaemia** is variable and incomplete; therefore, lipid-lowering medications should not be stopped unless clearly indicated (4D EASO 2017, Mancini 2014, Grade C; BEL 3 AACE/TOS/ASMBS 2013)[38, 42, 58].
  - Avoidance of **diuretics** may be suggested in the first week after surgery for the high risk of dehydration (4D EASO 2017)[38].Treatment of hypertension in the long-term should adhere to current general guidelines, possibly avoiding anti-hypertensive medications with a known unfavourable effect on body weight (4D EASO 2017)[38]. Because the effect of weight loss on blood pressure is variable, incomplete, and at times transient, antihypertensive medications should not be stopped unless clearly indicated (Mancini 2014, Grade D AACE/TOS/ASMBS 2013)[42, 58].
  - **Oral contraceptives** should be replaced by non-oral contraceptives due to reduced efficacy after gastric bypass and bilio-pancreatic diversion (3D EASO 2017)[38].
- **Crushed or liquid rapid-release** medications should be used instead of extended-release medications to maximize absorption in the **immediate postoperative period**, **about two months after surgery** (EL B, D IFSO-EC/EASO 2017, Mancini 2014, Grade D AACE/TOS/ASMBS 2013)[42, 48, 58]. However, it is important to ensure

that the liquid-dosage form does not contain absorbable sugars, in light of the risk for dumping syndrome (4D EASO 2017)[38].

- **Some drugs should be avoided:**
  - NSAIDs, salicylates, corticosteroids and other drugs that may cause gastric damage should be avoided. (3D EASO 2017, IFSO-EC/EASO 2017, Mancini 2014, Grade C; BEL 3 AACE/TOS/ASMBS 2013)[38, 58, 42, 48] and alternative pain medication should be identified before bariatric surgery (Grade D AACE/TOS/ASMBS 2013). One guideline suggest to prescribe proton pump inhibitors/histamine2 receptor antagonists for the entire first post-operative year after a BPD (IFSO-EC/EASO 2017)[48]
  - Drugs such as gemfibrozil or octreotide that increase the risk for the formation of gallstones should be avoided (EASO 2017)[38].

When discharged from the hospital, **patients** should be carefully instructed on the modifications of their medication regimen, including changes in prescription drugs, over-the-counter drugs, nutrient supplements and homeopathic drugs (EASO 2017)[38].

Involvement of **pharmacists** as advisors in the drug treatment is considered to be beneficial for both surgeons and patients (EASO 2017)[38].

Key intervention 27

After bariatric surgery, the potential effects and consequences that any bariatric procedure and weight loss may have on absorption and action of medications should be carefully considered and ongoing treatment should be adapted (Weak). Crushed or liquid rapid-release medication should be preferred over extended-release medication to maximize absorption in the immediate post-operative period (Weak). Some medications (e.g. NSAIDs, salicylates, corticosteroids and other drugs that may cause gastric damage) should be avoided (Weak). Moreover, before the discharge from the hospital, it is suggested to provide careful explanation to patients on the modification of their medication regimen and to involve pharmacists as advisors in the drug treatment (GPP).

4.6.2.8 Referral by the general practitioner

Because the assessment of obese patients is difficult after recent bariatric surgery and because general practitioners can be confronted to some difficulties, a list of problems needing **referrals** is suggested by some authors (O'Kane 2016, Welbourn 2016)[44, 56].

One author provides a list of problems in two categories (O'Kane 2016)[44] (See Figure 12).

Figure 12 – Primary care management of problems post-operative bariatric surgery (according to O'Kane 2016)[44].

- Serious problems within the first 2 weeks:
  - Acute renal failure.
  - Abdominal pain, tachycardia and pyrexia. This may indicate a leak or iatrogenic bowel injury until proven otherwise and requires emergency admission.
  - Chest pain, shortness of breath and tachypnoea. This may indicate a pulmonary embolus until proven otherwise and requires emergency admission.
  - Unilateral or bilateral swollen legs. This may indicate a DVT
  - Continuous vomiting, with or without abdominal pain. This may indicate an over-tight or slipped gastric band, stenotic anastomosis, kinked gastric sleeve or a bowel obstruction until proven otherwise and requires emergency admission.
  - *Following the insertion of a gastric band, a wound infection associated with the port site should be taken seriously. Some surgeons are happy to remove the infected port, tie off the tubing and wait for all signs of infection to pass before replacing the*

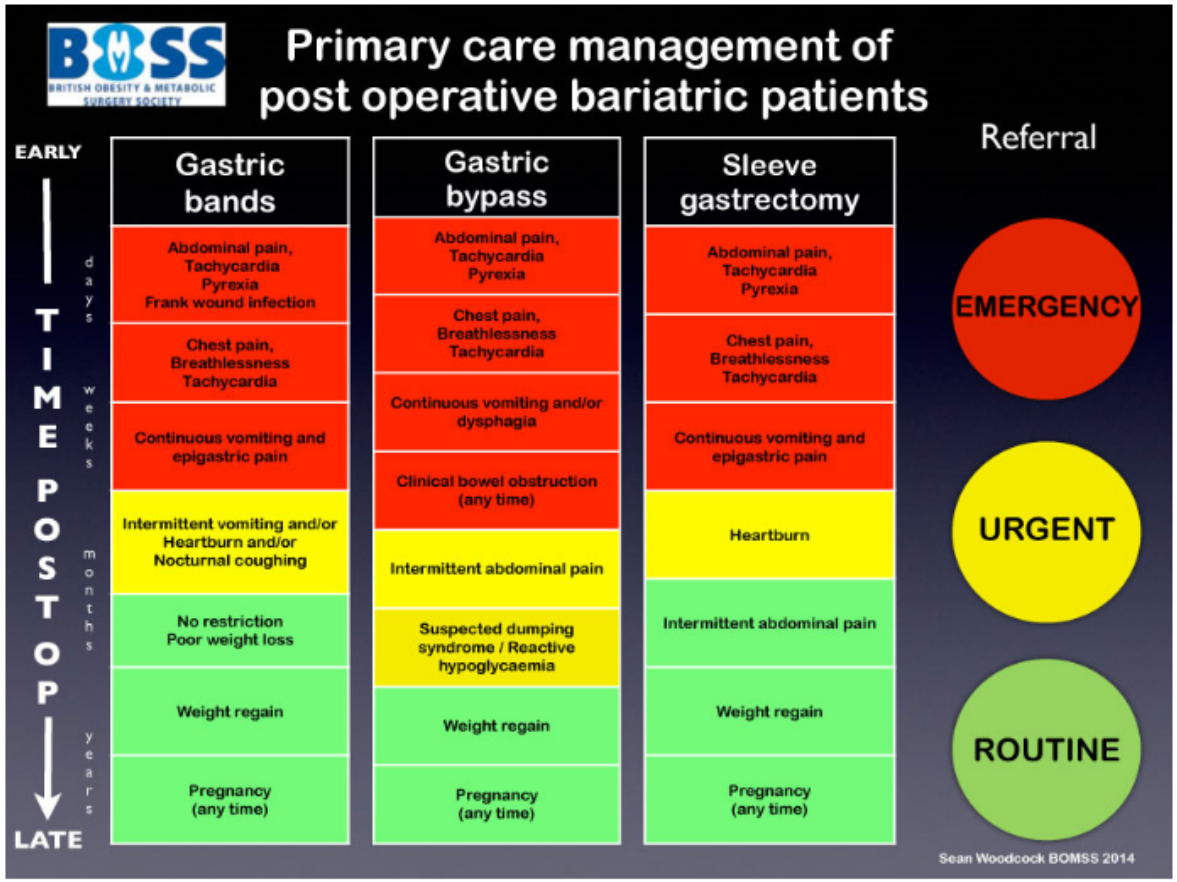
port. Other surgeons believe that the whole prosthesis is infected and will remove it all[w]

- Less serious problems within the first 2 weeks:
  - Dehydration with resulting constipation, which is common post bariatric surgery. Little and often is encouraged with respect to fluid intake to achieve an intake of 2 L day^{-1}.
  - *Patients with a gastric balloon will feel awful for a week, with nausea and vomiting. Most settle but occasionally may need to be admitted for intravenous fluids*[11].
  - Bruising/haematomas at the port sites.

In 2014, the BOMSS proposed also a list of symptoms justifying referrals, in three categories[54] (Figure 13).

[w] Out of scope of this project.

Figure 13 – Primary care management of problems post-operative bariatric surgery (according to BOMSS 2014)[54].



One author suggests to establish **local protocols/'red flags'** for urgent referral if a patient has a suspected surgical or nutritional complication (Welbourn 2016)[56].

Key intervention 28

A list of symptoms and complications that require urgent or semi-urgent referral back to the surgical team ('red flags') should be provided to the general practitioners (GPP).

4.6.2.9 Complication management

Several authors provide advice for the management of the most frequent complications after surgery. It is out of scope of this project to propose a specific treatment for each of the potential complications after bariatric surgery. The list below only aims to highlight the most important items and is predominantly based on one guideline of high quality (AACE/TOS/ASMBS 2013)[42]:

- Both the patient and primary care physician should be educated about **post-prandial hypoglycaemia** (PPH) after gastric bypass due to pancreatic beta cell hypertrophy, which can occur several months to years after surgery. Small, frequent, low glycaemic index meals are advised to treat both Dumping and PPH Syndromes. Further investigation and management of hypoglycaemia is needed if the patient fails to respond to dietary manipulation (Buzetto 2016, Grade D O'Kane 2016, 2+ Heber 2010)[39, 44].
- Nutritional advices (low sugar regimens, regular mealtime) should be the first line treatment for the control of **dumping syndrome**. Medical therapy should be considered only in patients who fail to be controlled with dietary modifications (1A for EASO 2017, Mancini 2014)[38, 58].
- In cases of **severe or unremitting post-operative weight gain,** it is suggested to determine whether the surgical manipulation of the gastrointestinal tract remains anatomically intact (e.g. absence of gastrogastric fistula after RYGB). If not intact, a multidisciplinary team should consider options, including patient education, behavior modification, additional weight loss strategies, or referral for revisional surgery as clinically indicated (2+ Heber 2010)[39].
- **Osteoporosis** should be evaluated by PTH, total calcium, phosphorus, 25-hydroxyvitamin D, and 24-hour urine calcium levels (Grade C; BEL 3 AACE/TOS/ASMBS 2013, EASO 2017)[38, 42]. Bisphosphonates may be considered only after appropriate therapy for calcium and vitamin D insufficiency (Grade C; BEL 3 AACE/TOS/ASMBS 2013, EASO 2017)[38, 42].
- **Oxalosis and calcium oxalate stones** can be **m**anaged by avoidance of dehydration (Grade D), a low oxalate meal plan (Grade D), oral calcium (Grade B, BEL 1, downgraded due to small evidence base), and potassium citrate therapy (Grade B, BEL 1, downgraded due to small evidence base)(AACE/TOS/ASMBS 2013)[42].
- **Anemia** without evidence of blood loss warrants evaluation of nutritional deficiencies, as well as age appropriate causes during the late postoperative period (Ebpracticenet 2018, Grade D AACE/TOS/ASMBS 2013)[42, 55]. Treatment regimens include oral ferrous sulfate, fumarate, or gluconate to provide up to 150-200 mg of elemental iron daily (Grade A; BEL 1)[42]. Vitamin C supplementation may be added simultaneously to increase iron absorption (Grade C; BEL 3 AACE/TOS/ASMBS 2013)[42].
- **Anastomotic ulcers** should be treated with H2 receptor blockers, proton pump inhibitors (PPI), sucralfate, and H. pylori eradication therapy if H pylori is identified (Grade C; BEL 3 AACE/TOS/ASMBS 2013)[42].
- **Gastrogastric fistula or herniation** in patients who previously underwent a RYGB with a non-partitioned stomach with symptoms of weight regain, marginal ulcer, stricture or gastroesophageal reflux, may lead to a revisional procedure (Grade C; BEL3 AACE/TOS/ASMBS 2013)[42].

- Prophylactic cholecystectomy may be considered with RYGB to prevent **gallbladder** complications (Grade B; BEL 2). Oral administration of ursodeoxycholic acid, at least 300 mg daily in divided doses, significantly decreases gallstone formation after RYGB and may be considered for use in patients after bariatric surgery who have not had a cholecystectomy (Grade A; BEL 1 AACE/TOS/ASMBS 2013)[42].
- **Gout** can be needed a prophylactic therapy in patients with frequent attacks (Heber 2010 2+)[39]
- Definitive repair of **asymptomatic abdominal wall hernias** can be deferred until weight loss has stabilized and nutritional status has improved, to allow for adequate healing (12 to 18 months after bariatric surgery) (Grade D AACE/TOS/ASMBS 2013)[42]. **Symptomatic hernias** that occur after bariatric surgery require prompt surgical evaluation (Grade C; BEL 3 AACE/TOS/ASMBS 2013)[42].
- Risk of Barrett's oesophagus (a possible consequence or complication of GERD) after sleeve gastrectomy need to be screened regularly during scheduled follow-up (Montastier 2018)[62].
- **Regarding excess skin, i**nformation on and access to recontructive surgery when appropriate should be provided (Welbourn 2018, Mc Grice 2015, NICE 2014, Mancini 2014, Grade C; BEL 3 AACE/TOS/ASMBS 2013, SIGN 2010, HAS 2009)[16, 40, 42, 43, 51, 58].
- This surgery is best pursued after weight loss has stabilized (at least 12 to 18 months after bariatric surgery) (Mancini 2014, Grade D AACE/TOS/ASMBS 2013, GPP SIGN 2010, GPP HAS 2009)[40, 42, 43, 58] and should be discussed with patient, MTD team and reconstructive surgery team (GPP HAS 2009)[40].
- Prescribing **weight loss medications before weight regain** may result in greater total weight loss (Kalarchian 2018, EASO 2017)[38, 67]. Re-do operations may halt weight regain or create further weight loss when applied at optimal timing (3 D EASO 2017)[38]. In general, the type of redo surgery should be chosen in line with a complex analysis of causes of weight regain, an interdisciplinary assessment of a given patient and the patient's preference (EASO 2017)[38].
- **Revision of a bariatric surgical procedure** can be recommended when serious complications related to previous bariatric surgery cannot be managed medically (Grade C BEL 3 for AACE/TOS/ASMBS 2013)[42].
- **Reversal of a bariatric surgical procedure** is recommended when serious complications related to previous bariatric surgery cannot be managed medically and are not amenable to surgical revision (Grade D for AACE/TOS/ASMBS 2013)[42].

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When complications are identified they have to be treated according to good clinical practice guidelines. It is beyond the scope of this study to identify the appropriate treatment option for each of the potential complications an/or side effects (GPP).

4.6.3 Composition of the team and time points of the post-operative period

4.6.3.1 Composition of the team

Given all the issues considered in the previous sections for the post-operative monitoring and management, it is obvious that a technically proficient surgical team is not enough for undertaking the follow-up after bariatric surgery. An integrated (para-)medical support team able to provide dietary instruction and behavior modification is needed to ensure an appropriate postoperatively and long term follow-up (Heber 2010 1+++)[39].

According to the literature, the healthcare professionals to be involved should encompass at least:

- The surgeon (EASO 2017, O'Kane 2016)[38, 44]. However this does not imply that patients have to be seen by a surgeon at each appointment. Patients can also be seen by appropriately trained allied healthcare professionals who have easy access to a surgeon if required (Rec NCEPOD in O'Kane 2016)[44].
- A specialist bariatric dietician/nutritionist (1A EASO 2017, ASMBS 2017, Rec NCEPOD in O'Kane 2016, GPP SIGN 2010)[38, 43-45].

- A specialist bariatric nurse who has to ensure coordinated care for the patient while in hospital and to provide specialist nursing care, support and advice to bariatric inpatient and outpatients care from assessment and throughout the pathway (Rec Grade D O'Kane 2016)[44]. For example, the nurse coordinator can be a support for patient empowerment and self-management (Funnell 2005)[59].

Other healthcare professionals can be:

- Clinical psychologist/psychiatrist: a consultation in routine is proposed by one guideline of very low quality (BASO 2016)[65] and is optional, depending on the assessment of the core team, for 2 guidelines of moderate to high quality (EASO 2017, NCEPOD recommendation O'Kane 2016)[38, 44].
- Bariatric physician (Physician in internal medicine or endocrinology with specific bariatric expertise) (EASO 2017, Rec NCEPOD in O'Kane 2016)[38, 44], depending on the assessment of the core team (O'Kane 2016)[44].
- Pharmacist (with experience in bariatric surgery) in order to discuss pharmacotherapies and medications with careful consideration of altered pharmacokinetics and pharmacodynamics of drugs following bariatric surgery (Grade D O'Kane 2016)[44].
- Physiotherapist is quoted as referral resource for early mobilization in the immediate post-operative phase and for supporting patients to become more physically active (Grade D O'Kane 2016)[44].

Whatever the composition of the MDT, a close collaboration with the primary care physicians is suggested in order to prepare the discharge from the bariatric service, for example after the first 2 years of follow-up (Montastier 2018, EASO 2017, Welbourn 2016)[38, 56, 62].

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Besides a technically proficient surgical team, an integrated (para-) medical support team able to provide dietary instructions and behavior modifications is needed to ensure an appropriate postoperatively and long term follow-up (Strong). The multidisciplinary team can involve at least the surgeon, a specialist bariatric dietician and a specialist bariatric nurse (GPP). Access to other healthcare professionals can be considered such as clinical psychologists/psychiatrists, pharmacists, physiotherapist… (GPP). A close collaboration with the general practitioner is suggested in order to prepare the discharge from the bariatric service and the long-term follow-up (GPP).

4.6.3.2 Time points

There is no consistency on the frequency of consultation within the bariatric surgical center during the first 2 years but at least 4 appointments in the first year, then once or twice a year is considered as a minimum (EASO 2017, IFSO-EC/EASO 2017, Grade D O'Kane 2016, BASO 2016 & 2014, BOMSS 2014, HAS 2009)[38, 40, 44, 48, 54, 65]. This frequency can be adapted according to the bariatric procedure performed (O'Kane 2016, BOMSS 2014, Grade D AACE/TOS/ASMBS 2013)[42, 44, 54], the severity of co-morbidities (O'Kane 2016, Grade D AACE/TOS/ASMBS 2013)[42, 44] and the patient's needs (Sogg 2016, O'Kane 2016, BOMSS 2014)[44, 46, 54].

A follow-up telephone call within 7 days of surgery between the bariatric surgery team and the patient is recommended by one guideline (NCEPOD recommendation O'Kane 2016)[44]. The time for the initial face-to-face appointment with one member of the bariatric team (e.g. surgeon, dietician, etc.) varies between 2 weeks (ASMBS 2017, BASO 2016, O'Kane 2016, Petrick 2015)[44, 45, 63, 65] and 4 weeks (Ebpracticenet 2018, Baccara-Dinet 2010)[55, 60].

As shown in the table below, the healthcare professionals involved in each consultation can vary.

Table 21 – Follow-up time point of bariatric surgery by kind of healthcare professionals

Time	2 w	4w	6-8w	3mo	6mo	9mo	12mo	18mo	24mo
Surgeon	X ASMBS 2017 Petrick 2015	X Ebpracticenet 2018, BASO 2016 & 2014 Baccara 2010		X BASO 2016 Baccara 2010	X BASO 2014 (NOT IN 2016) Baccara 2010	Baccara 2010	Baccara 2010		Baccara 2010
Dietician	X ASMBS 2017 Petrick 2015	X ASMBS 2017 Petrick 2015 Agnetti 2015	X ASMBS 2017 O'Kane 2016* Petrick 2015	X ASMBS 2017 BASO 2016 & 2014 O'Kane 2016	X ASMBS 2017 BASO 2016 & 2014 O'Kane 2016	X ASMBS 2017 BASO** 2016 & 2014 O'Kane 2016	X BASO 2016 & 2014 O'Kane 2016	X BASO 2016 & 2014 O'Kane 2016	X BASO 2016 & 2014 O'Kane 2016
Diet advice in group	X BASO 2016 & 2014	X BASO 2016 & 2014							
Endocrinologist				X BASO 2014	X BASO 2016		X BASO 2016 & 2014	X BASO 2016 & 2014	X BASO 2016 & 2014
Psychologist					X BASO 2016		O BASO 2016 & 2014		X BASO 2014
Bariatric Nurse	X*** O'KANE 2016	X*** O'KANE 2016	X*** O'KANE 2016	X*** O'KANE 2016	X*** O'KANE 2016	X*** O'KANE 2016	X*** O'KANE 2016	X*** O'KANE 2016	X*** O'KANE 2016
Gynaecologist (F)							X BASO 2016 & 2014		

X=systematically; O=optional, on indication

**After this first appointment, O'Kane suggests frequent appointments by phone or face-to-face during the first year (e.g. 4-6 weekly)[44]*

***At 9 months consultation dietician, on indication of the dietician if problems on 6 months post-op (BASO 2016)[65].*

****The frequency of follow-up will be determined by the patient's needs, the bariatric procedure and severity of other comorbidities*

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There is no consistency on the frequency of consultation within the bariatric surgical service during the first 2 years but at least 4 appointments in the first year, then once or twice a year is considered as a minimum (GPP). The frequency of follow-up can be determined by the patient's needs, the bariatric procedure and the severity of other comorbidities (GPP).

4.7 Long term follow-up

The organizational aspect of the post bariatric management differs between countries: for example, in England, patients are followed-up in the bariatric surgical service for a minimum of 2 years[x] and after that, there are a number of suggested shared care models (O'Kane 2016)[44]; in Canada, prior to bariatric surgery all patients verbally commit to 5 years of follow-up in the multidisciplinary clinic (Aarts 2017); in Belgium, a guideline suggests to transfer the follow-up to the primary care system between 12 to 42 months after the surgery (Ebpracticenet 2018)[55].

The **timing of the discharge** from the bariatric centre is paramount because weight regain is common 2-10 years after surgery (Mc Grice 2015)[51] and discharge can coincide with the end of weight loss, the start of weight regain and patients' need of more intensive support for adhering to lifestyle and dietary advice (Parretti 2018)[50]. Moreover the practice of discharging patients 2 years after surgery appears suboptimal considering the risks of depression and suicide (Mingrone 2018)[52].

The literature is relatively poor regarding the long term follow-up after bariatric surgery. Few guidelines detail this topic and evidence are missing (O'Kane 2016)[44].

A **multidisciplinary approach** is mentioned for the long term follow-up after bariatric surgery as part of a shared care model of chronic disease management (Grade D O'Kane 2016, NICE 2014)[16, 44].

The healthcare professionals proposed to be involved are surgeon, bariatric dietician, psychologist, social workers (individual or group meetings) and general practitioner (GP) or endocrinologist (Montastier 2018)[62].

According to Montastier, "most bariatric centers cope with an imbalance between an increasing number of required follow-ups and a stable number of clinicians and support staff" (Montastier 2018)[62]. The long term follow-up should therefore be performed outside the bariatric centers. However, the **involvement of general practitioners** and their expertise in bariatric long term follow-up is questioned (Montastier 2018)[62]

In this context, O'Kane 2016[44] proposes 4 models in long term care after bariatric surgery (see Figure 14)

[x] Patients with higher risk of metabolic and biochemical complications (menorrhagia, renal impairment, metformin…) or BPS/DS patients probably require lifelong FU in the specialist centre (O'Kane 2016)[44]

Figure 14 – Models of long term care after bariatric surgery according to O'Kane 2016[44]

Model 1: GP annual blood tests and comorbidities review model
The patient's care is shared between the specialist centre and the GP. This ensures that the patient has access to specialist advice and support. Capacity would need to be built into the **specialist centres to accommodate annual reviews**. Both the GP and the specialist centres need robust systems to ensure annual reviews take place.
Model 2: GP annual blood tests and comorbidities review plus model
The patient is followed up by **GP only,** with an **annual nutritional review provided by the Tier 3 dietician** (and referral back if necessary). This nutritional review may be via a face to face, telephone, postal or electronic consultation. The GP needs a robust system to ensure the review takes place and timely information is sent to the specialist centre. The GP would also be charged with the responsibility of forwarding appropriate data back to the original surgical unit for entry to the national bariatric surgical registry (NBSR).
Model 3: specialist follow-up model
The patient is followed-up by **specialist team** (usually a local Tier 3 service). There needs to be a robust recall system, and the service must be commissioned and funded to enable annual review. There needs to be **good communication with the GP**. If the patient moves out of area, the care may need to be passed onto another specialist team. The specialist centre sends data to the original surgical unit for entry into the NBSR.
Model 4: joint appointments in primary care model
The patient is followed-up **jointly by the specialist team and GP in the community**. This ensures that the patient has access to specialist advice and support. Capacity would need to be built into the specialist centres staffing to accommodate annual reviews. Both the GP and the specialist centres need robust systems to ensure annual reviews take place. This enables knowledge and skills to be shared and may be more convenient for the patient. The specialist centre sends data to the original surgical unit for entry into the NBSR.

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The timing of discharge from specialized bariatric services should be considered carefully because discharge can coincide with the end of weight loss, the start of weight regain and patients' need of more intensive support for adhering to lifestyle and dietary advice (GPP). A multidisciplinary approach is suggested with involvement of surgeon, bariatric dietician, psychologist, social workers (individual or group meetings) and general practitioner or endocrinologist (GPP). However, the specific expertise of the general practitioner in bariatric care is questioned.

4.7.1 Long term follow-up monitoring

Whatever the discharge timing proposed and the healthcare professionals involved in the follow-up, there is consistent recommendations that people should be offered **at least annual clinical and labs monitoring** (Welbourn 2018, Mc Grice 2015)[51] in **collaboration with the GP** (Welbourn 2018, Welbourn 2016)[41, 56].

Based on several publications (Montastier 2018, Ebpracticenet 2018, Welbourn 2018, O'Kane 2016, Farmaka 2016, Welbourn 2016, Parretti 2015, Heber 2010)[39, 44, 50, 55, 56, 62], it is suggested that this assessment include annually at least:

- **Weight check** (R Welbourn 2018, Ebpracticenet 2018, Farmaka 2016, Grade C O'Kane 2016, Welbourn 2016, Parretti 2015)[41, 44, 49, 50, 55, 56]. At discharge after 2 years, the focus is on weight maintenance rather than continued weight loss (O'Kane 2016)[44]. Weigth regain tends to occur in a gradual and progressive manner (Mc Grice 2015)[51].This can indicate the importance of regular long-term anthropometrical measurements and follow-up (Mc Grice 2015)[51]. Patients with BMI increasing but monitored by GP can be referred to local weight management services (Parretti 2015)[50]. Patients should also check their weight regularly themselves (Parretti 2015)[50].
- Assessment of **nutritional intake** (R Welbourn 2018, Farmaka 2016, Grade C O'Kane 2016, Welbourn 2016, Parretti 2015)[41, 44, 49, 56]: some patients can have maladaptive eating patterns and poor nutritional intake.
- **Screening for nutritional deficiencies:**
  - **Search of risk factors for deficiencies** (e.g. alcohol consumption) (Farmaka 2016).
  - Search of **clinical signs** (neurological signs, hair loss, hematoma, muscles weakness, taste disorders…) **of malnutrition or vitamin/micronutriment deficiencies** (Farmaka 2016, Montastier 2018, Grade C O'Kane 2016, Welbourn 2016, Parretti 2015)[44, 49, 50, 56, 62].
  - Review of **compliance to intake of multivitamin and mineral supplements** (R Welbourn 2018, Grade C O'Kane 2016, Welbourn 2016, Parretti 2015)[41, 44, 50, 56].
  - **Labs monitoring** followed by investigation of abnormal results and appropriate treatment as required (Farmaka 2016, Grade C O'Kane 2016, Welbourn 2016, Parretti 2015)[44, 49, 50, 56]. Table 18 in the point 4.6.1.4. provides the list of element to be monitored every 12 months).
- Assessment of **comorbidities** (R Welbourn 2018, Ebpracticenet 2018, Grade C O'Kane 2016, Welbourn 2016, Parretti 2015)[41, 44, 50, 55, 56] including diabetes, hypertension, hypercholesterolemia or obstructive sleep apnea. Even when patients achieve normoglycaemia without treatment, they should remain in follow-up for their diabetes indefinitely (R Welbourn 2018[41].
- Regular **psychological or mental health disorders** assessment (e.g. depression, disturbed eating behaviours, loss of eating control associated with weight regain) (Welbourn 2018)[41]. Because the psychological management post bariatric surgery can be complex, there should be a low threshold for referral to mental health specialist (Parretti 2015)[50].
- Monitoring of **alcohol** (not only because risk of vitamin deficiency) **and other substance use disorders** (Sogg 2016)[46].
- Review of **potential concerning symptoms or complications** such as vomiting, anemia, pain, neuropathy, heartburn… (R Welbourn 2018, Farmaka 2016, Grade C O'Kane 2016)[41, 44, 49]. Some information on the complication management are available in the point 4.6.2.9. Symptoms of continuous vomiting, dysphagia, intestinal obstruction (gastric bypass) or severe abdominal pain require emergency admission under the local surgical team (Parretti 2015)[50].

- Check **chronic medications**, particularly those with narrow margin between therapeutic and toxic doses (e.g. thyroid hormone, anti-epilepsy, vitamin K antagonists) (Farmaka 2016)[49]. This medication review is particularly relevant after gastric bypass or BDP/DS (Parretti 2015)[50].
    - Anticoagulants should be monitored carefully (Parretti 2015)[50].
    - Comorbidity medications such as hypertensives, diabetes medications, etc. as to be checked because requirements that had fallen with postoperative weight loss may increase later if weight loss is not maintained (Parretti 2015)[50].
    - Psychiatric medications may need increased or divided doses (Parretti 2015)[50].
    - Diuretics have to be used with caution due to the increase risk of hypokalemia (Parretti 2015)[50].
    - Non-steroidal anti-inflammatory drugs and bisphosphonates should be avoided (Parretti 2015).
    - Pill size: Since around 6 weeks postoperatively, usual medication formulations should be tolerated (Parretti 2015)[50].

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After discharge from bariatric surgery service, at least annual follow-up assessment is considered useful for all patients (GPP). This assessment can encompass at least weight, nutritional status (intake and potential deficiencies), psychological health, substances and alcohol use, comorbidities, complications and medication evaluation (GPP).

4.7.2 Long term follow-up management

As for long term follow-up assessment, several authors emphasize the need of a regular and supportive management of patients in the long term after bariatric surgery (Montastier 2018, NICE 2014)[16, 62] but the specific content of this management is poorly described and little is known about the best clinical strategies for maintenance of health benefit after bariatric surgery (Montastier 2018)[62].

Based on few publications, the following recommendations are identified:

- Reinforce **healthy eating habits**, such as eating slowly, portion control, and meeting protein requirements (Montastier 2018[y])[62];
- Encourage patients to **monitor food intake** and have **regular weight check** (Grade D O'Kane 2016, Parretti 2015)[44, 50]. Where there is excessive weight gain, consideration should be given to referring the patient Grade D O'Kane 2016)[44];
- Offer **physical activity advice** and referral individually tailored to each patient (Montastier 2018, C Welbourn 2018, Grade D O'Kane 2016, Welbourn 2016)[41, 44, 56, 62]; According to Hood 2016, levels of physical activity are linked to long-term weight maintenance but it is also the most common domain of non-adherence among bariatric surgery patients (Hood 2016)[66].
- Ensure that patient continue **multivitamin supplementation** (Farmaka 2016)[49] and **treat deficiencies** (R Welbourn 2018, Grade C O'Kane 2016)[41, 44]. A proposition of routine supplementation is presented in the Table 22.

[y] Long term = After at least 1 year for Montastier

Table 22 – Long term supplementation after bariatric surgery according to Farmaka 2016[49] and BMS 2015[50]

Micronutriments	Sleeve	Bypass	BPD +/- DS
Multivitamins	✓ (Farmaka, Parretti)	✓ (Farmaka, Parretti)	✓ (Farmaka, Parretti)
Ca/Vit D	Consider (Farmaka) ✓ (Parretti)	✓ (Farmaka, Parretti)	✓ (Farmaka, Parretti)
Vit B12	Consider (Farmaka) ✓ (Parretti)	✓ (Farmaka, Parretti)	✓ (Farmaka, Parretti)
Iron	Consider (Farmaka, Parretti)	✓ (Farmaka, Parretti)	✓ (Farmaka, Parretti)
Vit A, E, K, Zn, Cu, Se			Consider (Farmaka, Parretti)
Vit B1	If persistent vomiting, rapid weight loss, alcohol use disorder, parenteral nutrition, nutritional deficiency of Vit B1		

✓= systematic, according to at least 2 guidelines; consider = according to at least 1 guidelines, op basis of clinical signs and lab.

- Ensure that patients continue to have adequate access to appropriate psychological / specialist mental health services (Welbourn 2016, Parretti 2015)50, 56.
- Ensure that co-morbidities are managed: diabetes control optimised (Welbourn 2016)56; patients on treatment for OSA reviewed by a sleep clinic. (Welbourn 2016)56.
- Manage potential complications such as described in the point 4.3.8.9.
- Provide information on, or access to, reconstructive surgery for removal of excess skin tissue that interferes with function if clinically appropriate (C Welbourn 2018, Welbourn 2016, NICE recommendation quoted by O'Kane 2016)16, 41, 44, 56; Reconstructive surgery should be delayed until weight loss post bariatric surgery has reached a plateau (GPP SIGN 2010)43.
- Consider that requirements of medication that had fallen with postoperative weight loss for those previously at high cardiovascular risk due to diabetes, dyslipidemia and hypertension may increase later if weight loss is not maintained (Welbourn 2018, Farmaka 2016, Welbourn 2016, Parretti 2015)41, 49, 50, 56 and remind other advices on medication such as avoid NSAID (Farmaka 2016)[49] (See point 4.3.8.7).

An important issue in the long term is the problem that **patients' adherence to the follow-up** may not be easily maintained over the course of patient's life (Montastier 2018, Funnell 2005)[59, 62]. Therefore, more patient's centered care appears to be needed and organizational tool such as **personalized care** easily accessible via e-mail, phone, or through the general practitioner is proposed as a part of optimal care (Montastier 2018)[62]. (See Chapter Organizational level).

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After discharge from bariatric surgery service, it is suggested to encourage all patients to maintain healthy eating habits and lifestyle changes, monitor food intake, have regular weight checks, physical activity and take multivitamin supplementation (GPP). The management of comorbidities, complications and medications is part of the follow-up (GPP). Access to psychological support services and to reconstructive surgery is considered (GPP). In order to support patient adherence to the long-term follow-up, some organizational tools are proposed such as easily accessible personalized care by e-mail, phone or through general practitioner (GPP).

4.8 Pregnancy

Pregnancy is commonly considered in the guidelines dedicated to bariatric surgery. This can be explained by the fact that bariatric surgery has some effects on fertily (linked to the weight loss) but also on maternal and foetal outcomes (see Table 23) (EASO 2017)[38]. For example, a higher risk of stillbirth is mentioned in pregnancies occurring in the first year post-surgery (EASO 2017)[38].

Table 23 – Effects of bariatric surgery on maternal and foetal outcomes (EASO 2017)[38]

Maternal outcomes	Risk	Foetal outcomes	Risk
Gestational diabetes	reduced	small for gestational age	increased
Gestational hypertension	reduced	premature labour	increased
Miscarriage	limited data	low birthweight	increased
Post-partum haemorrhage	limited data	large for gestational age	reduced
Pre-eclampsia	reduced	perinatal mortality	no difference

However, most of the recommendations regarding pregnancy and bariatric surgery are based on **low level of evidence or GPP**. They are presented below according to the preoperative and postoperative period.

4.8.1.1 Preoperative period

The recommendations are consistent regarding the fact that women who are candidates for bariatric surgery should **avoid pregnancy** in the preparatory period and for **at least 12 to 18 months** postoperatively (Grade 3D EASO 2017, Grade C O'Kane 2016, BOMSS 2014, Mancini 2014, Grade D AACE/TOS/ASMBS 2013, Agnetti 2011, Grade C HAS 2009)[38, 40, 42, 44, 47, 54, 58]. This implies several issues:

- Women of reproductive age should be advised that their **fertility status might be improved** postoperatively (EASO 2017)[38]. This is particular mentioned for women with polycystic ovary syndrome (BOMSS 2014, Mancini 2014, Grade D AACE/TOS/ASMBS 2013)[42, 54, 58].
- **Contraceptive choices and plans** for pregnancy should be discussed early (Welbourn 2018, EASO 2017, Parretti 2015, Grade D AACE/TOS/ASMBS 2013)[38, 41, 42, 50].
- **Estrogen therapy should be discontinued** before bariatric surgery (1 cycle of oral contraceptives in premenopausal women) to reduce the risks for postoperative thromboembolic phenomena (Mancini 2014, Grade D AACE/TOS/ASMBS 2013)[42, 58].
- A **pregnancy test should be realized** in all childbearing age women (48 hours before surgery) (Mingrone 2018, ASMBS 2017, GPP HAS 2009)[40, 45, 52].

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Women of reproductive age candidates for bariatric surgery should be offered early discussion on fertility (that can increase after surgery), pregnancy (that should be avoid before and 12-18 months after surgery) and contraception (with discontinuation of oestrogens) (Weak).

4.8.1.2 Post-operative period, before pregnancy

As mentioned above, women at reproductive age should avoid pregnancy for at least 12 to 18 months postoperatively (Grade 3D EASO 2017, Grade C O'Kane 2016, BOMSS 2014, Mancini 2014, Agnetti 2011)[38, 44, 47, 54, 58]. More important than the delay is the **weight stabilisation and the nutritional deficiencies corrections** (Agnetti 2011)[47].

Therefore two issues are to be discussed with women at reproductive age: contraception and pregnancy preparation. This leads to several recommendations:

- Appropriate **non-oral contraception** should be considered (implant, coil or barrier are believed to be the best because of vomiting or diarrhoea and impaired absorption) (EASO 2017, GRADE C O'Kane 2016, Mancini 2014, AACE/TOS/ASMBS 2013)[38, 42, 44, 58].

- Oral contraception is not recommended because of issues with absorption (Parretti 2015)[50], particularly in case of RYGB and bilio-pancreatic diversion (EASO 2017, Grade D AACE/TOS/ASMBS 2013, HAS 2009)[38, 40, 42].
- Depo-Provera are not recommended because of issues with weight regain (Parretti 2015)[50].
- Implant, coil or barrier are believed to be the best because of vomiting or diarrhoea and impaired absorption (EASO 2017, GRADE C O'Kane 2016)[38, 44].

- Women should have access to **preconception evaluation, counselling and advice regarding nutritional supplements** (GRADE D O'Kane 2016, Agnetti 2011, Grade C HAS 2009)[40, 44, 47]. This preconception counselling focus aims specifically to avoid folates and iron deficiencies (Agnetti 2011, HAS 2009)[40, 47]. Vitamin B12, vitamin D and calcium are also mentioned by an old guidelines (Grade C HAS 2009)[40].
  - In preparation for pregnancy, women should take an additional 400 µg of folic acid in the pre-conception period, and women with a BMI that remains in the obese range or with type 2 diabetes should take 5 mg/day until the 12th week of pregnancy (EASO 2017)[38].
  - In addition, women should be advised to avoid multivitamins containing vitamin A in the retinol form in the first 12 weeks of pregnancy (EASO 2017, BOMSS 2014)[38, 54].

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- **All women of reproductive age should be counselled on contraceptive choices following bariatric surgery (with implant, coil or barrier considered as the best choice) (Weak).**
- **All women of reproductive age should also have access to preconception counselling and advice regarding nutritional supplements after bariatric surgery (Weak).**

4.8.1.3 Post-operative period, during pregnancy

Some guidelines mentioned that women who become pregnant after bariatric surgery should be counselled and monitored for appropriate weight gain, nutritional supplementation, and for foetal health (Parretti 2015, BOMSS 2014 CE, Mancini 2014, Grade C BEL 3 AACE/TOS/ASMBS 2013)[42, 50, 54, 58].

This implies that:

- Antenatal care should be offered via a **specialist multidisciplinary antenatal care team** at a specialised centre with experience in pregnancy following bariatric surgery (4 D EASO 2017, GPP HAS 2009)[38, 40]. Pregnant women after bariatric surgery should receive specific monitoring on the following points:
  - Screening for **gestational diabetes** should be offered, however the conventional oral glucose tolerance test should be avoided. Serial capillary glucose monitoring should be used as an alternative. (4 D EASO 2017)[38]. To detect gestational diabetes, alternative paths like fasting and 2h postprandial glycaemia have to be used after RYGB, BPDS or BPD-DS or if the patients reports dumping complications (Mancini 2014)[58].
  - **Blood pressure** should be measured at every visit (EASO 2017)[38].
  - **Routine ultrasounds** should be performed at weeks 12 and 20. Bariatric surgery should be viewed as a risk factor for IUGR, an additional growth scan should be performed and the subsequent need for further growth surveillance should be determined at that point (EASO 2017)[38].
  - Women presenting with **abdominal pain** in pregnancy should be offered urgent expert assessment, particularly for complications related to the primary bariatric surgical procedure (3D EASO 2017)[38].

- Specialist **dietary advice by experienced dieticians** should be offered during pregnancy (EASO 2017, HAS 2009) [38, 40].
    - Active **weight loss and caloric restriction** are not recommended during pregnancy (EASO 2017)[38]. Weight gain in pregnancy should be in line with standard recommendations for pre-pregnancy BMI (EASO 2017)[38].
    - Pregnant women should consume a balanced diet containing **60 g protein daily** (EASO 2017)[38].
    - **Free sugar-rich** foods and beverages should be avoided as these can precipitate dumping syndrome (EASO 2017)[38].
- Patients who do become pregnant following bariatric surgery should have **nutritional surveillance and laboratory screening** for deficiency **every trimester**, including iron/ferritin, folate and B12, calcium, and fat soluble vitamins (EASO 2017, O'Kane 2016, BOMSS 2014, Mancini 2014, Grade D AACE/TOS/ASMBS 2013)[38, 42, 44, 54, 58].
    - Pregnant patients, especially those who have had distal bypass or BPD/DS procedures, may be at risk of low **vitamin A levels** and possibly **vitamins E and K**. Vitamin A levels (and possibly vitamin E and K levels) should be monitored during pregnancy. A more frequent review with the specialist bariatric dietician may be required (BOMSS 2014 quoting AACE/TOS/ASMBS 2013)[42, 54].
- **Nutritional supplement** should be changed for one that is appropriate for pregnancy in the form of a prenatal multivitamin preparation (3 D EASO 2017, Parretti 2015)[38, 50].
    - Once-daily **folic acid** 5 mg is recommended for the first twelve weeks of pregnancy (Parretti 2015, BOMSS 2014)[50, 54], particularly in women with a BMI that remains in the obese range or with type 2 diabetes (EASO 2017)[38].
    - **Vitamin B12** is routinely recommended by some guidelines (3 D EASO 2017)[38] or should be continued in those currently receiving them and provided to those who not receive them but have a deficiency in the labs results (for sleeve) (Parretti 2015)[50].
    - Oral **calcium** supplements is routinely recommended by some guidelines (3 D EASO 2017)[38].
    - **Vitamin D** supplementation has to be continued as indicated by vitamin D levels and osteoporosis guidance (Parretti 2015)[50].
    - Once-daily **iron** 200 mg is recommended (Parretti 2015)[50].
    - Vitamin and mineral supplements in the **retinol form** should be avoided in the first 12 weeks of pregnancy (BOMSS 2014)[54]. Because, especially after distal bypass or BPD/DS, there is a risk of low vitamin A level, health care professional should consider vitamin A in the beta carotene form if appropriate (BOMSS 2014)[54].

Key intervention 37

It is suggested that all pregnant women after bariatric surgery should be followed by a specialist multidisciplinary antenatal care team with experience in pregnancy following this kind of surgery (GPP). Some concerns are gestational diabetes, blood pressure, need of ultrasound and management of abdominal pain (GPP). Moreover pregnant women are considered as requiring specific dietary advice, nutritional monitoring and vitamin/minerals supplementations (GPP).

4.9 Organizational level

Although no specific search strategy was carried out on particular organizational aspects (e.g. financial issues for the patients) of the bariatric surgery pathway, some propositions can be formulated from the selected literature (Welbourn 2018, Parretti 2015, SIGN 2010, Baccara-Dinet 2010)[41, 43, 50, 60].

Five targets are considered in this chapter: healthcare professionals, patients, bariatric centers, data collection and reimbursement.

4.9.1.1 Healthcare professionals

Multidisciplinary team

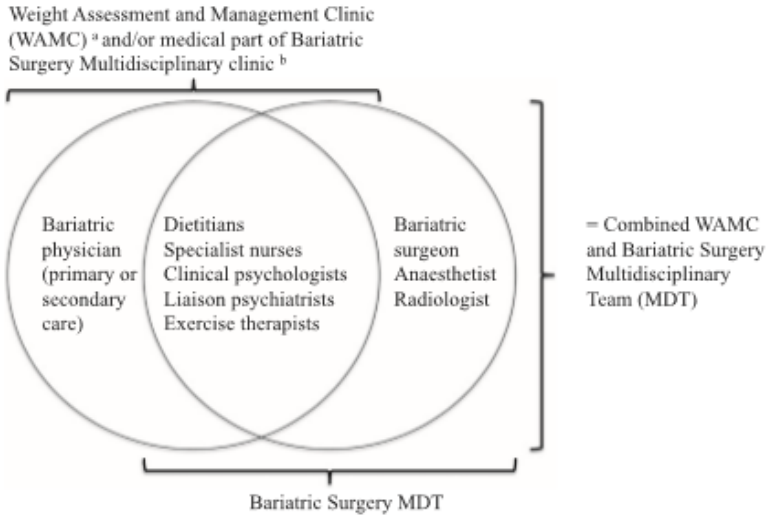
As mentioned throughout this document, **a multidisciplinary team (MDT**) is promoted by many guidelines for managing weight patients, before and after the bariatric surgery (Welbourn 2018, IFSO-EC/EASO 2017, O'Kane 2016, NICE 2014, Heber 2010, SIGN 2010, HAS 2009)[16, 39-41, 43, 44, 48].

The composition of the team can vary depending on the authors and the pre- or post-operative phase but contains, besides a bariatric surgeon, at least an endocrinologist (or a bariatric physician i.e. physician specializing in the care of patients with overweight or obesity), a dietician and a psychologist (the core of the multidisciplinary team). Additional healthcare professionals (HCP) such as a specialized nurse, psychiatrist professional, physiotherapist, etc. are also proposed (more info in pre- and post-operative assessment above). General practitioners (or primary care physician) are also mentioned as potential member of the MDT (Baccara 2010,Heber 2010)[39, 60].

Moreover, beside the "core" multidisciplinary team, some patient groups may require care of other medical professions because of their higher risk of metabolic and biochemical complications (O'Kane 2016)[44].

In the UK, Welbourn proposes a **flexible structure** for the MDT depending on the location of the team, in primary or secondary care (see Figure 15).

Figure 15 – Venn diagram showing how the multidisciplinary team (MDT) can be structured depending on its location (a) if in primary or community care it is separate from the surgical MDT and refers in as a hub and spoke and (b) if in secondary care most team members are likely shared between the clinics. Welbourn 2018[41]



In this pathway, the follow-up is ensured by the WAMC until patients are medically stable and a shared care plan is proposed for long term follow-up, in collaboration with the GP.

General practitioner and other primary care HCP

The role of general practitioner (GP) is acknowledged at different levels from the preoperative phase to the long term follow-up:

- For referring patients to the MDT in order to consider surgery (Welbourn 2018)[41];
- For describing potential benefits of specialist assessment of the patient's obesity and related complications (Welbourn 2018)[41];

- For informing patient of guidelines and criteria for bariatric surgery (Welbourn 2018)[41];
- For participating to the decision: For example, some French bariatric centers invite GP to the multidisciplinary preoperative concertation meeting (Baccara-Dinet 2010)[60].
- For identifying severe complications after surgery (red flags) and referring the patients who needed it at the earliest stage possible (Welbourn 2018)[41];
- For referring patients with previous bariatric surgery if there is weight regain and nutritional deficiency or if revisional surgery might be needed (Welbourn 2018)[41];
- For supporting the patient adherence to the follow-up appointments with the MDT; it is highlighted that GP could decrease the lost to follow-up patients at 1 year at the bariatric centers (Baccara-Dinet 2010)[60];
- For assessing the mental health and psychological issues and referring if appropriate (Welbourn 2018)[41];
- For ensuring the long-term follow-up in a shared care plan model (Montastier 2018, Welbourn 2018, O'Kane 2016, NICE 2014, Heber 2010)[16, 39, 41, 44, 62]. Parretti provides 10 tips for the patients' post-operative management in primary care (Parretti 2015)[50].

However these roles imply some improvements at least in level of knowledge and expertise in bariatric care (Montastier 2018)[62].

Communication between healthcare professionals

Because a good communication between healthcare professionals, GP included, is crucial (GRADE C O'Kane 2016)[44], some organizational tips are proposed:

- Invitation of the GP and other primary care professionals **in the MDT** and/or identification of the GP as the coordinator of the bariatric care (Baccara 2010)[60].
- Ad hoc **written communication** between the bariatric center HCP and the GP (and the patients):
  - **Within 24h after hospital discharge**, a comprehensive written discharge summary is provided to the GP, including operation details, nutritional supplements prescribed, post-operative discharge plan (NCEPOD recommendation O'Kane 2016)[44].
  - **During the follow-up by the bariatric team**: If a patient persistently does not attend follow-ups, the bariatric surgical services should contact the GP and put their concerns in writing to both the GP and patient. The GP and, importantly, the patient must be informed of the need for continued nutritional monitoring and compliance with vitamin and mineral supplements. (GRADE D O'Kane 2016)[44].
  - **After 2 years of F-U**: Discharge letters (to the GP and the patient) must contain full details of the following: bariatric procedure, emergency contact numbers, annual blood tests required, long-term vitamins and minerals supplements, lifestyle modifications and when to refer back (Grade D O'Kane 2016)[44].
- Development of **local platforms of exchange**. These platforms would allow contact between secondary and primary care and integrated care. This can be translated in local protocols. According to Welbourn 2018[41], the bariatric center and GP have to share care (from the hospital discharge) according to a model of chronic disease management with individual roles agreed for what should be achieved at each review. Together they:
  - Include referral pathways back to the bariatric center, surgical unit or mental health professional as needed
  - Include local protocols for investigations of anaemia, pain, vomiting, neuropathy or weight regain
  - Include local protocols for assessment of psychological difficulties e.g. depression, disturbed eating behaviours, loss of eating control associated with weight regain

Training of health care professionals

Several authors emphasize the need of experienced surgeons in the multidisciplinary teams (Aird 2017, Ebpracticenet 2018, NICE 2014)[16, 55, 69].

Some criteria are proposed by NICE for recognize the surgeon expertise[16]: "The surgeon in the multidisciplinary team should:

- have had a relevant supervised training programme
- have specialist experience in bariatric surgery
- submit data for a national clinical audit scheme (see below).

Other healthcare professionals, including endocrinologists, general practitioners, obstetricians, midwives, dieticians, other primary care staff (e.g. physiotherapists, psychologists) and emergency department staff need training in the management of bariatric surgery patients(GRADE D O'Kane 2016, (BOMSS 2014, HAS 2009)[40, 44, 54].

Some specific examples are provided in the literature such as awareness of **potential complications** post bariatric surgery and knowledge of **how to refer back** to the bariatric team in a timely and appropriate manner for general practitioners (O'Kane 2016)[44]; specific knowledge in bariatric nutrition, screening for eating disorders, and psychosocial assessment for dieticians (BOMSS 2014)[54] or specialized knowledge, experience and training relevant to obesity, eating disorders and bariatric surgery for psychologist, social worker, psychiatric nurse and psychiatrist (Sogg 2016)[46].

Some tools are proposed in order to support training and knowledge transfer towards HCPs:

- This could be in the form of **e-learning modules** (GRADE D O'Kane 2016)[44].
- **Teamwork and discussion on feedback** is another way to train the HCPs (Petrick 2015)[63].
- **Reminders and decision-aids within the EMR** can also support the HCP to follow the pathway (Petrick 2015)[63].

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- **A MDT is promoted in the pre- and post-operative management of bariatric patient with at least, besides a bariatric surgeon, an endocrinologist, a dietician and a psychologist (GPP).**
- **The role of general practitioner is acknowledged at different levels from the preoperative phase to the long term follow-up but should be facilitated by several communication exchanges (GPP).**
- **It is suggested to facilitate communication between the MDT, the general practitioner (and other primary care HCPs) and the patient by inviting the GP within the MDT, organizing written information at the different phases of the pathway and developing local protocols (GPP).**
- **A specific training is needed to ensure that HCPs (including general practitioner and other primary care staff) are able to manage the bariatric patients at the long term (GPP). Some tools such as e-learning modules, discussion on feedback and decision-aids within the EMR are proposed to support this training (GPP).**

4.9.1.2 Patient's involvement

One concern in bariatric surgery is the decrease of adherence to the lifestyle changes in long term after bariatric surgery, because they are time consuming and can be cognitively challenging, leading to what is referred to as ''behavioural fatigue" (Hood 2016)[66]. Several authors emphasise the importance of mechanisms for patient engagement and propose some strategies to improve compliance in the bariatric surgery population (Welbourn 2018, Montastier 2018, O'Kane 2016, Hood 2016, Mc Grice 2015, Funnell 2005)[41, 44, 51, 59, 62, 66]. These strategies covers three issues: educational support, practical support and patient-centred care.

Educational support

Different methods are proposed in the literature for supporting education in self-management:

- **Digital communication** could be used to increase engagement with patients and minimize barriers such as time, distance, and cost (Mc Grice 2015)[51]. Several remote means can be used such as **internet-based information, text messages via e-mail, smart-phone apps, social media, and video or telephone consultations**. They combine advantages that was easily accessible, and available to the patient indefinitely (Monastier 2018)[62]. Practical examples are:
  - **Mobile health (mHealth)** enhances access to health information for patients/providers, facilitates remote patient monitoring (given the ability to measure weight, glucose, cardiovascular function, physical activity, and other health variables), and delivers timely healthcare recommendations to patients (Hoods 2016)[66].
  - **Link between the patient self-management support with provider support** (e.g. system changes, patient flow, logistics…) (Funnell 2005)[59].
  - **Video or telephone consultations can offer** a variety of appointment times (Hoods 2016)[66];
- **Support groups and connection between pre-op patients and successful post-op patients** is quoted by several authors (ASMBS 2017, IFSO-EC/EASO 2017, O'Kane 2016, Sogg 2016, Hood 2016, NICE 2014, AACE/TOS/ASMBS 2013, Funnell 2005)[16, 42, 44-46, 48, 59, 66].
- **Educative sessions** can be organized on individual basis or in group (GPP HAS 2009)[40].
- **Written information** can support the transfer knowledge to the patient such as **information leaflets** on the need, and provision for, long-term follow-up including pregnancy advice (Welbourn 2018)[41];

Practical support

Some tools can be found in the selected literature for supporting the patient commitment in the bariatric surgery pathway:

- **A medic alert bracelet or a bariatric alert card** providing details of the bariatric procedure and medications should be available for patients (GRADE D O'Kane 2016, HAS 2009)[40,44].
- A **daily food intake journal and exercise diary** can be used to help patients with self-management (Mc Grice 2015)[51].
- **Portion-controlled foods adapted to the unique needs of the patient** is suggested as a support for a more intensive strategy for reducing calorie intake and increasing weight loss (Kalarchian 2018)[67].
- **Pill organizers and electronic reminders** can support adherence to micronutriments supplementation and assist with memory issues (Hoods 2016)[66].
- **Technology enhanced scales** could be effective for supporting self-weighting and for transmitting measurements of weight to the treatment team (Kalarchian 2018)[67].Because physical activity is the domain with the lowest adherence rates but the strongest associations with long-term weight loss, **developing creative methods** for enhancing physical activity is a critical area for future development (Hoods 2016)[66]. **Home exercise equipement** can be an option (Kalarchian 2018)[67].

Patient-centered care

Besides educational program and practical support, patients need ongoing self-management support from their providers and the entire health-care team to maintain the types of behavioral change needed for months or years and a lifetime of postoperative self-care (Funnell 2005)[59]. Patient-centered care that incorporates self-management support from all HCPs and is integrated into the flow of the visits is therefore crucial and can be declined in different ways:

- Facilitate access to **behavioural health (or educational) experts** and involve health care professionals with strong communication skills within the MDT (Hoods 2016, Funnel 2005)[59]; behavioral health experts can monitor health behaviour adherence, address negative cognitions and emotions that can occur, and use motivational interviewing and behavioural problem solving to address barriers before and after surgery (Hoods 2016)[66].
- Assist **patients in selecting one area of self-management on which to concentrate** that can be reinforced by all team members (Funnell 2005)[59].
- Listen **patients and ask what they need** including issues about living with bariatric surgery that are rarely addressed by their providers; "asking questions and using active listening techniques can help patients reflect on issues or problems and lead to identification of effective strategies to which patients are willing to commit" (Funnell 2005)[59].
- Care about patients as **individuals first and about their weight loss second** (e.g. rather than beginning the visit with a review of the patients' diet, exercise and weights, HCPs can ask how they are feeling (psychologically as well as physically) and how they believe that they are doing in reaching their self-selected goals and caring for themselves) (Funnell 2005)[59].
- Provide information in **formats and languages** that are suited to the person. Use everyday, jargon-free language and explain any technical terms when talking to the person and their family or carers. Take into account the person's:
  - age and stage of life
  - gender
  - cultural needs and sensitivities
  - ethnicity
  - social and economic circumstances
  - specific communication needs (for example because of learning disabilities, physical disabilities or cognitive impairments due to neurological conditions) (Welbourn 2018, Hoods 2016)[41, 66].

Key intervention 39

Several strategies can be proposed in order to enhance the patients' engagement in the lifestyle changes and follow-up requirements after bariatric surgery (GPP). These strategies use educational support (e.g. digital communication, support groups, educative sessions and written information), practical supports (e.g. medic alert bracelet, daily food intake journal, technology enhanced scales, exercise diary or Pill organizers and electronic reminders) and patient-centred care that incorporates self-management support from all HCPs and is integrated into the flow of the visits (GPP).

4.9.1.3 Requirements for bariatric centers

A minimum of patients managed each year is considered important for some authors, although there has been limited research examining the role of standardized approaches to bariatric surgery within the selected publications (Aird 2017, Ebpracticenet 2018)[55, 69].

According to Aird 2017: "*In 2012, Zevin et al. performed a systematic review supporting the association between high-volume surgeons and high-volume centers in improving patient outcomes. Similarly, Hollenbeak demonstrated significantly lower mortality in Pennsylvania hospitals that were classified as high-volume hospitals ([100 cases/year) or with surgeons who performed [100 cases/year. Finally, accredited Centers of Excellence by the American Society of Metabolic and Bariatric Surgeons and American College of Surgeons were found to have significantly lower complication rates than non-accredited hospitals by Morton et al*" (Aird 2017)[69]. Therefore, they propose a minimum requirement **including ICU availability, postoperative oximetry beds, and a minimum 120 bariatric cases per site per year** (Aird 2017)[69].

Key intervention 40

Specific equipment such as ICU availability, and a minimum of bariatric cases per year are suggested to be a minimum requirements for bariatric centres (GPP).

4.9.1.4 Data collection

The need of a registry in bariatric surgery is mentioned by several authors but mostly without details (Welbourn 2018, Aird 2017, Welbourn 2016, Parretti 2015, Baccara-Dinet 2010, HAS 2009)[40, 41, 50, 56, 60, 69].

According to the HAS[40], there are 3 aims of this registry:

- To assess the **impact of recommendations on practice** and their appropriation by professionals;
- To know the short and long-term **efficacy and safety** data of the medical-surgical teams;
- To monitor the **evolution in techniques**.

This implies that the registry gathers data for all kinds of bariatric surgery and in each step of the patients' management (HAS 2009)[40]:

- preoperative (obesity, comorbidities and history);
- operative (kind of intervention, duration, monitoring);
- post-operative (efficacy: weight, comorbidities improvement, quality of life and safety; specific and general complications, at short and long term).

According to NICE 2014, each surgeon should submit data for a national clinical audit scheme. so that the outcomes and complications of different procedures, the impact on quality of life and nutritional status, and the effect on comorbidities can be monitored in both the short and the long term (NICE 2014)[16].

Key intervention 41

It is suggested to collect data on each step of the patients' management for all kind of bariatric surgery to assess guidelines implementation, efficacy and safety, and technical evolution in bariatric surgery (GPP). A national registry is proposed (GPP).

4.9.1.5 Reimbursement

In 2019, the HAS[40] mentioned several not reimbursed activities that hampered the follow-up of bariatric patient in France such as:

- vitamin supplement in post-operative phase ;
- proteins supplements ;
- psychologist consultations ;
- dietician consultations; the need of reimbursement of dietician consultation in France is therefore confirmed by Agnetti in 2011[47] ;
- certain biological tests (e.g. vitamin B1) ;
- certain activity of plastic surgery (e.g. mammoplasty) ;
- sessions of therapeutic education.

In 2014, the BASO[53] mentioned the same concerns in Belgium and asked for the reimbursement of:

- pre-operative visits: "dietician (2 visits), psychologist, smoking cessation counseling, endocrinologist and gynaecologist in addition to bariatric surgery to reinforce the awareness that bariatric surgery is best positioned into an overhaul of lifestyle changes. In addition, BASO proposed the reimbursement of an obesity coordinator/200 operated patients (1 FTE/200 patients). When several visits are necessary it should be possible to have additional reimbursement on a case by case basis".

- the multidisciplinary meeting between all involved health care workers to reinforce a multidisciplinary approach. The need of a compensation for multidisciplinary meetings is quoted in order to promote a true multidisciplinary approach (Baccara 2010)[60].
- 2 years of follow-up together with bariatric surgery to reinforce the need for lifestyle changes.
- a consultation with the physical therapist to evaluate the need for rehabilitation path postoperatively (because the need for rehabilitation is well recognized in the obese population and greatly helped by surgically induced weight loss).

In 2014, BASO[53] estimated the total cost of additional reimbursement for the minimal package of consultations (intake + follow-up) to 843.69 €.

Table 24 – List of 2014 not reimbursed costs for which reimbursement was requested according to BASO Currently not reimbursed costs for which reimbursement is requested in the future (minimal number of visits)

Not reimbursed at this time	INTAKE	FOLLOW-UP
Consult Dietician	43.28 EUR	151.48 EUR
Consult Psychologist	45.00 EUR	90.00 EUR
Smoking Cessation	45.00 EUR	
Physiotherapist	43.28 EUR	
Multidisciplinary Deliberation	79.65 EUR	
Total	256.21 EUR	241.48 EUR
Obesity Coordinator	346,00 EUR	

Key intervention 42

Reimbursement of certain activities related to bariatric surgery is suggested such as dietician, psychologist, smoking cessation counseling, endocrinologist and gynaecologist consultation (GPP).

4.10 Key points

Some authors highlight the value of care pathways toward improvements in short- and long term clinical outcomes in bariatric surgery (ASMBS 2017, Petrick 2015)[45, 63]. Petrick showed that a bariatric pathway containing 34 (mainly pre-operative) best-practice elements can improve the length of stay, ICU use, post-operative complication and readmission rates (Petrick 2015)[63].

However the lack of robust recent evidence hampers to formulate strong recommendations and contributes to variability of practices in terms of preoperative assessment and preparation, post-operative monitoring and management and long term follow-up. This section highlights some concordant variables (e.g. preoperative nutritional evaluation, preoperative psychosocial evaluation and postoperative laboratory values) that can be used as a first basis to develop the Belgian care pathway for bariatric surgery and proposes 'good practice points'.

- **Preoperative period**
- **A multidisciplinary/interdisciplinary team (MDT) has to be involved in the management of patients who are candidates for bariatric surgery (Strong). An Endocrinologist or a related physician, a bariatric surgeon, a mental health professional (psychologist, psychiatrist) and a dietician (or nutritionist) should be the healthcare professionals forming the core of this MDT (Weak).**
- **General practitioners should be involved in the preoperative management of patients (Weak).**
- **The duration of the preoperative phase is not clearly defined but takes generally several months (GPP)**
- **A complete history taking and physical examination have to be performed before taking the decision for bariatric surgery (Strong). Issues to be considered should be at least weight/BMI trends, hormonal and genetic obesity causes if not identified previously, obesity related co-morbidities, medical reasons to exclude patients from surgery, substance abuse and medications use (Weak).**

- **Prior to bariatric surgery, a comprehensive nutritional status assessment is recommended (Strong). This assessment can encompass weight and dietetic history, eating behaviours (with identification of eating disorders), macro- and micronutrients deficiencies and mastication capacity (GPP). The use of a standardised dietician checklist tool can be considered (GPP).**
- **A psychosocial-behavioural evaluation should be performed to detect any severe mental health disorder representing a formal contraindication to surgery or requiring a specific pre- or post-operative management to enhance the safety and efficacy of surgical treatment (Weak). The psychosocial-behavioural evaluation can also assess areas of vulnerability and positive factors that can be considered in an individually tailored support plan if appropriate (GPP). The relevant findings can be summarized in a final report with suggestion of interventions to minimize barriers and risk of poor outcome (GPP). A direct communication of these results to the patient and the other bariatric team members is suggested (GPP).**
- **Additional consultations with specialists can be indicated according to patients' characteristics, co-morbidities or other criteria (GPP).**
- **Some labs tests are consistently quoted to be routinely performed such as blood type, complete blood count, coagulation profile, iron/ferritin/transferrin, fasting blood glucose, lipid panel, liver function test, renal function, vitamin B9 (ac folic), vitamin B12, vitamin D, calcium, PTH and pregnancy tests for all female patients of childbearing age (Weak).**
- **Few technical examinations are routinely considered before bariatric surgery i.e. ECG and chest radiography (Weak).**
- **Other examinations can be prescribed according to clinical symptoms or risk factors: Endoscopy, Upper gastrointestinal (UGI) series, H-Pylori testing, abdominal ultrasound, DEXA, polysomnography (GPP).**
- **Finally, because obesity is a risk factor for certain malignancies, all patients should be encouraged to have routine cancer screening by a primary care provider based on age and risk factors. These screening tests should be done according to the current national guidelines (Weak).**
- **A truly informed consent and active participation in one's own care are suggested for all patients before deciding for bariatric surgery (GPP). This implies a thorough discussion between the surgeon or the hospital/centre bariatric specialist and the patient, with person's family as appropriate (GPP). Understanding of surgery options, risks and benefits, and acceptance of lifestyle modification, including behavioral changes and follow-up compliance are important points of discussion (GPP). Educational support such as group sessions organized by the bariatric center, local patient support groups and social media (online forums, websites) can be useful for sustaining the patient information and education (GPP). It is suggested to adapt educational support for patients with cognitive difficulties (GPP) and to document the informed consent in the patient record (GPP).**
- **Nutritional counselling is considered as an important phase in the preoperative management of obese patients and can encompass informational, educational and therapeutic elements (GPP). The dietary preparation can be tailored for each patient and can allow patients to develop new skills for endorsing diet behavioural changes and improve nutritional status before surgery. It is suggested to perform an evaluation for assessing the efficacy of the programme in terms of knowledge and skills (GPP). It is also suggested to document the elements of the nutritional programme in the patient record (GPP).**

- It is suggested to advise all patients to integrate a physical activity adapted to their musculoskeletal and cardio-pulmonary conditions, lifestyle and preferences at a regular basis in their daily life (GPP). Patients who smoke cigarettes have to stop, preferably at least 6 weeks before bariatric surgery (Strong). Patients identified with alcohol dependence should be abstinent at least 1 year before surgery and all patients should be informed on the risk of alcohol use disorder post-operatively, especially in the case of RYGB (Weak).
- Support by psychologist/psychiatrist specialized in bariatric surgery and obesity is considered in the preoperative bariatric surgery phase for providing individually tailored management plan if appropriate (GPP). The goal of this plan is to enhance patients' motivation and ability to comply with nutritional, behavioral and psychosocial changes before and after surgery (GPP).
- Some co-morbidities should be managed before bariatric surgery to reduce the risk of the surgical procedure (Weak): diabetes has to be managed by a comprehensive care plan including healthy dietary patterns, medical nutrition therapy, physical activity, and as needed, pharmacotherapy (Strong); other co-morbidities to be considered are hypothyroidism, hyperlipidaemia, OSA syndrome, DVT and gout (GPP).

Decision making

- The decision for bariatric surgery should result from a concertation process within the specialised multidisciplinary bariatric team with involvement of the general practitioners, patients and the patients' family (GPP). Some green lights 'checklists' can support and stimulate a true informed consent process (GPP). It is suggested that the results are documented in the patient record and communicated to the patient, to all members of the multidisciplinary team (as well as other specialists involved in patient's care) and to the general practitioner (GPP).

Postoperative period

- Besides a technically proficient surgical team, an integrated (para-)medical support team able to provide dietary instructions and behavior modifications is needed to ensure an appropriate postoperatively and long term follow-up (Strong). The multidisciplinary team can involve at least the surgeon, a specialist bariatric dietician and a specialist bariatric nurse (GPP). Access to other healthcare professionals can be considered such as clinical psychologists/psychiatrists, pharmacists, physiotherapist… (GPP). A close collaboration with the general practitioner is suggested in order to prepare the discharge from the bariatric service and the long-term follow-up (GPP).
- There is no consistency on the frequency of consultation within the bariatric surgical service during the first 2 years but at least 4 appointments in the first year, then once or twice a year is considered as a minimum (GPP). The frequency of follow-up can be determined by the patient's needs, the bariatric procedure and the severity of other comorbidities (GPP).
- During the first 2 years after bariatric surgery, the follow-up is generally provided by the bariatric service. Regular medical history and clinical examination can encompass monitoring of weight, nutritional intake, vitamin and mineral intake, complications or malfunctioning, co-morbidities, quality of life and assessment of medication (GPP). These regular examinations could be performed by surgeons or by appropriately trained healthcare professionals who have easy access to a surgeon if required (GPP). Starting the consultation by focusing on the patient's feelings can encourage patient's empowerment and involvement (GPP).

- **A comprehensive nutritional assessment can be systematically proposed to the patient after bariatric surgery and can be performed by specifically trained dieticians (GPP). Dieticians can verify the appropriateness of the diet, the (compliance with) behavioural changes (including vitamins and mineral supplementation if appropriate) and identify potential problems requiring a referral to other healthcare professionals (GPP). They can also check the impact of the nutritional and behavioural changes on the patient's practical life and wellbeing (GPP). It is suggested to register the results of the assessment in the patient record (GPP).**
- **A psychological assessment should be systematically proposed to the patient (Weak). It is suggested that the assessment encompasses the psychological, social, and family impact of surgery with the aim to identify patients that require psychology/psychiatric support (GPP).**
- **Routine monitoring of biochemical, hematological and metabolic changes is recommended following bariatric surgery to allow that nutritional supplementation is adjusted on an individualized basis (Strong). Regular assessment of complete blood count, iron/ferritin/transferrin, albumin/prealbumin, vitamin B12, vitamin D, Ca, PTH, plasma glucose, liver function tests and renal function should be proposed routinely whatever the type of surgical procedure (Weak). Patients who have undergone malabsorptive surgical procedure (i.e. RYGB, BPD and BPD/DS) should have vitamin B9 (folic acid), vitamin A, zinc and copper levels followed at least every 6 months (Weak).**
- **Dual-energy x-ray absorptiometry (DEXA) is the only technical examination that should be considered systematically, mainly after RYGB, BDP or BDP/DS and could be performed bi-annually (Weak). Other examinations can be prescribed based on an assessment of clinical symptoms or risk factors: Upper gastrointestinal endoscopy, abdominal and pelvic CT scan colonoscopy, abdominal ultrasound and exploratory laparotomy or laparoscopy (Weak).**
- **After bariatric surgery, several interventions are recommended to support a successful lifelong adjustment to the consequences of the surgery. These interventions are part of a multidisciplinary approach and encompass behavioral modifications (including dietary changes and physical activity), but also if appropriate, pharmacologic therapy and/or surgical revision (Strong). A stepped care approach starting with a minimal, low-intensity intervention and proposing components of increasing intensity in case of poor outcome is suggested (GPP).**
- **Education sessions providing practical knowledge, skills and support to the patients is considered as important after bariatric surgery because behavioural changes are needed to optimize weight after the intervention (GPP). It is suggested that these education sessions are provided by a multidisciplinary team, start in the preoperative phase and be continued in the postoperative period (GPP). Some suggestions are proposed to increase the patient's empowerment and involvement such as self-monitoring of weight, food and physical activity, digital communication tool or participation to support groups (GPP).**

- **It is proposed that bariatric patients receive regular nutritional counselling by a dietician with expertise in bariatric surgery care or a trained health professional about long-term dietary modifications (GPP). The focus of dietary counselling should be the adaptation of patients eating and drinking behaviour to the changed needs after surgery (Weak). An appropriate protein intake (min 60g/d) seems particularly important in the first months after bariatric surgery (Weak). Advice regarding daily life and management of digestive intolerances are other considered issues (GPP). It is also suggested to propose to the patient to use a nutritional diary and to use a standardized registry of patient's data (GPP).**
- **Long-term vitamin and mineral supplementation is recommended in all patients undergoing bariatric surgery (Strong). Potentially more extensive replacement therapy is needed for patients who have had malabsorptive procedures or have some risk factors (GPP).**
- **Minimal daily nutritional supplementation for patients, in chewable form initially (i.e., 3 to 6 months), should include at least vitamin B1 (thiamin) (Weak), vitamin B9 (folic acid) (Strong), vitamin D (Weak), calcium (Weak), iron (Strong), copper (Weak), zinc (Weak) and selenium (Weak). This supplementation should also contain vitamin A and vitamin B12 after malabsorptive surgery (weak).**
- **Additional supplementation is required according to the results of periodic laboratory surveillance for nutritional deficiencies (Weak).**
- **The role of the diet is also highlighted and patients can be encouraged to have dietary sources of micronutriments (GPP).**

- **Support to patients' mental health and psychosocial needs should be provided and continued after bariatric surgery with adequate access to a clinical psychologist or a psychiatry professional when appropriate. A concertation with the MDT team is needed, with a particular attention if the psychological support is performed by an external psychologist or psychiatrist (GPP). The psychological support can help patients in the process of psychological reorganization related to significant body image disturbance after surgery, continue previous management of eating or psychiatric disorders, and support patients more vulnerable for developing depressive illness, post-operative alcohol/substance use disorders and risk of suicide (GPP).**
- **Physical activity has to be encouraged after bariatric surgery, starting immediately (or at least in the short term) after the recovery from surgery (Strong). Patients should be advised to incorporate moderate aerobic physical activity to include a minimum of 150 min/week. Yet it is advised to aim 300 min/week, as well as to undertake 2–3 times per week endurance and gradually strength training (Weak). Some strategies are suggested to support the patient commitment in physical exercise such as referral to specialist physiotherapy, exercises programmes, group session or use of an exercise diary (GPP).**
- **Tobacco use has to be avoided after bariatric surgery given the increased risk for poor wound healing, anastomotic ulcer, and overall impaired health (Strong);**
- **Alcohol use should be limited after bariatric surgery because it leads to excess caloric intake and should be avoided after RYGB due to impaired alcohol metabolism and risk of alcohol use disorders postoperatively (Weak).**

- After bariatric surgery, the potential effects and consequences that any bariatric procedure and weight loss may have on absorption and action of medications should be carefully considered and ongoing treatment should be adapted (Weak). Crushed or liquid rapid-release medication should be preferred over extended-release medication to maximize absorption in the immediate post-operative period (Weak). Some medications (e.g. NSAIDs, salicylates, corticosteroids and other drugs that may cause gastric damage) should be avoided (Weak). Moreover, before the discharge from the hospital, it is suggested to provide careful explanation to patients on the modification of their medication regimen and to involve pharmacists as advisors in the drug treatment (GPP).
- A list of symptoms and complications that require urgent or semi-urgent referral back to the surgical team ('red flags') should be provided to the general practitioners (GPP).
- When complications are identified they have to be treated according to good clinical practice guidelines. It is beyond the scope of this study to identify the appropriate treatment option for each of the potential complications an/or side effects (GPP).
- The timing of discharge from specialized bariatric services should be considered carefully because discharge can coincide with the end of weight loss, the start of weight regain and patients' need of more intensive support for adhering to lifestyle and dietary advice (GPP). A multidisciplinary approach is suggested with involvement of surgeon, bariatric dietician, psychologist, social workers (individual or group meetings) and general practitioner or endocrinologist (GPP). However, the specific expertise of the general practitioner in bariatric care is questioned.
- After discharge from bariatric surgery service, at least annual follow-up assessment is considered useful for all patients (GPP). This assessment can encompass at least weight, nutritional status (intake and potential deficiencies), psychological health, substances and alcohol use, comorbidities, complications and medication evaluation (GPP).
- After discharge from bariatric surgery service, it is suggested to encourage all patients to maintain healthy eating habits and lifestyle changes, monitor food intake, have regular weight checks, physical activity and take multivitamin supplementation (GPP). The management of comorbidities, complications and medications is part of the follow-up (GPP). Access to psychological support services and to reconstructive surgery is considered (GPP). In order to support patient adherence to the long-term follow-up, some organizational tools are proposed such as easily accessible personalized care by e-mail, phone or through general practitioner (GPP).

Pregnancy

- Women of reproductive age candidates for bariatric surgery should be offered early discussion on fertility (that can increase after surgery), pregnancy (that should be avoid before and 12-18 months after surgery) and contraception (with discontinuation of oestrogens) (Weak).
- All women of reproductive age should be counselled on contraceptive choices following bariatric surgery (with implant, coil or barrier considered as the best choice) (Weak).
- All women of reproductive age should also have access to preconception counselling and advice regarding nutritional supplements after bariatric surgery (Weak).

- **It is suggested that all pregnant women after bariatric surgery should be followed by a specialist multidisciplinary antenatal care team with experience in pregnancy following this kind of surgery (GPP). Some concerns are gestational diabetes, blood pressure, need of ultrasound and management of abdominal pain (GPP). Moreover pregnant women are considered as requiring specific dietary advice, nutritional monitoring and vitamin/minerals supplementations (GPP).**

Organization

- **A MDT is promoted in the pre- and post-operative management of bariatric patient with at least, besides a bariatric surgeon, an endocrinologist, a dietician and a psychologist (GPP).**
- **The role of general practitioner is acknowledged at different levels from the preoperative phase to the long term follow-up but should be facilitated by several communication exchanges (GPP).**
- **It is suggested to facilitate communication between the MDT, the general practitioner (and other primary care HCPs) and the patient by inviting the GP within the MDT, organizing written information at the different phases of the pathway and developing local protocols (GPP).**
- **A specific training is needed to ensure that HCPs (including general practitioner and other primary care staff) are able to manage the bariatric patients at the long term (GPP). Some tools such as e-learning modules, discussion on feedback and decision-aids within the EMR are proposed to support this training (GPP).**
- **Several strategies can be proposed in order to enhance the patients' engagement in the lifestyle changes and follow-up requirements after bariatric surgery (GPP). These strategies use educational support (e.g. digital communication, support groups, educative sessions and written information), practical supports (e.g. medic alert bracelet, daily food intake journal, technology enhanced scales, exercise diary or Pill organizers and electronic reminders) and patient-centred care that incorporates self-management support from all HCPs and is integrated into the flow of the visits (GPP).**
- **Specific equipment such as ICU availability, and a minimum of bariatric cases per year are suggested to be a minimum requirements for bariatric centres (GPP).**
- **It is suggested to collect data on each step of the patients' management for all kind of bariatric surgery to assess guidelines implementation, efficacy and safety, and technical evolution in bariatric surgery (GPP). A national registry is proposed (GPP).**
- **Reimbursement of certain activities related to bariatric surgery is suggested such as dietician, psychologist, smoking cessation counseling, endocrinologist and gynaecologist consultation (GPP).**

5 INTERNATIONAL DESCRIPTION OF ORGANISATION AND PAYMENT

5.1 Introduction and study approach

Are there lessons for Belgium in how other countries organize the care for bariatric surgery patients?

From the previous chapters (e.g. description Belgian situation; qualitative study) we learn that there are many problems and shortcomings in the organization and payment of the care pathway for bariatric surgery patients. In addition, the analysis of current pathways and guidelines makes clear that most 'key interventions for a care pathway' are consensus rather than evidence based. As such many practical questions remain unanswered (e.g. what is the role of bariatric surgery centres versus primary care in follow-up; how to decrease attrition rates; should bariatric surgery centres and surgeons reach minimal volume thresholds). Therefore we will study a number of practices applied abroad. The main aim of the evaluation of the organization and payment systems in other countries is to draw lessons for the Belgian context. All these elements will be, after consultation with relevant Belgian stakeholders, used to formulate recommendations.

Study approach

This part of the study has not the ambition to be exhaustive. We want to identify best-practices, alternative policy approaches, barriers, facilitators, etc. We selected, after an internet search, the following four countries/regions:

- The Netherlands:
  - Main reasons for selection: a policy of concentration of care in a limited number of high-volume centres; a mandatory registry.
- England:
  - Main reasons for selection: existing NICE-guideline; country in which the care for bariatric surgery is organised in different tiers with 'conservative treatment as mandatory step before access to surgery is allowed'; a mandatory registry.
- France:
  - Main reasons for selection: country with similar utilization rates and a large and recent evaluation of the organisation of bariatric surgery.
- Sweden;
  - Main reasons for selection: a strong mandatory registry combined with large degree of freedom for local actors to decide how to organise the care for bariatric surgery patients.

This selection was presented to a panel of experts (See colophon, Meeting in Leuven on June 24th 2019). During this meeting it was confimed that this selection would yield important insights. The experts were asked to suggest additional coutries but they assessed that other regions would not yield extra insights.

For each of the selected regions:

- We conducted a desk-research and compiled a first draft of chapter (about 15 pages for each of the 4 countries) based on grey and peer-reviewed literature.
- We identified an expert per country and asked him to give his feedback on the part that concerns the country of interest (and indicate sources of information that were missing).

Beside the analysis of the 4 countries, it was decided to conduct a rapid narrative review on two sub-themes: compliance with follow-up care and volume-outcome relationship.

For this rapid narrative review we conducted a search in OVID-Medline, sifted the literature (1 researcher) and synthesised the findings. The main lessons and conclusions based on this literature were integrated in the solution elements (see Chapter 6) submitted to Belgian experts (Meeting December 16th 2019). These experts confirmed the lessons learned based on the review.

5.2 The Netherlands

5.2.1 *Criteria for reimbursement bariatric surgery and utilization rates*

Criteria for reimbursement

The inclusion criteria for primary bariatric surgery in the Netherlands are linked to requirements based on the Dutch Obesity Guideline[z].. This guideline is based on the literature (dating back to 2011) and expert consensus.[70] In order to be eligible for surgery patients have to meet the following requirements:

- a body mass index (BMI) of ≥ 40.0 kg/m², or a BMI ≥ 35.0 kg/m² in combination with at least one of the 6 major obese-related comorbidities:
  - diabetes mellitus;
  - hypertension;
  - dyslipidemia;
  - obstructive sleep apnea syndrome;
  - gastroesophageal reflux disease (GERD);
  - severe, disabling musculoskeletal complaints.
- Aged 18-65 years. Patients aged above 65 years can exceptionally undergo bariatric surgery on a case-by-case evaluation. Bariatric surgery for children is not indicated despite some very exceptional cases.[71]

When patients lose weight during the pre-bariatric surgery pathway (when the decision for bariatric surgery is already taken) and reach a BMI-level that is below the criteria, this is not a contra-indication.[72] The guideline also specifies that patients must be sufficiently healthy to undergo general anesthesia and surgery and that bariatric surgery is contraindicated if patients suffer from severe psychological problems, addiction to alcohol, drugs or other substances, an active gastrointestinal disease, or a disease that is life threatening on short terms.[72]

In 2014 a negative advice was given to extend the criteria for bariatric surgery to patients with a BMI between 30 and 35 kg/m² if they have type 2 diabetes mellitus.[73] The Dutch Obesity guideline is currently being reviewed and the enlargement of the criteria for bariatric surgery to adolescents with a BMI ≥ 40.0 kg/m² and diabetes patients with a BMI between 30 and 35 kg/m^2 are included within the scope of the guideline update (foreseen to be published in May 2020).

When criteria are accepted by the public authorities (Dutch National Health Care Institute or Zorginstituut Nederland) the health insurers (zorgverzekeraars) are (via the Health Insurance Act/ 'Zorgverzekeringswet') obliged to offer these services to the insured. On the other hand, services not adopted by the public authorities are not reimbursed. This could explain why (In 2017) 95.8% of the operated patients did meet the BMI-criteria and were older than 18 years.[74]

[z] A new version of the Dutch Obesity Guideline was being developed during this study and expected to be published in May 2020. Yet, this was not publicly available at the time of writing of the current report. Therefore we had to use the most recent publicly available, but soon outdated version.

Utilization of bariatric surgery increases

The number of people in the Netherlands with a BMI of more than 35 kg/m² increased from about 222 000 in 2007 to about 335 000 in 2017. The number of bariatric surgery procedures increased from about 3 500 in 2007 to more than 10 000 in 2017.[75] Indeed, in 2017 there were 10 655 primary and 1 428 secondary interventions registered in the bariatric surgery registry.[74] Based on expert consultation it appears that very few patients in the Netherlands undergo 'non-reimbursed (i.e. self-pay)' bariatric surgery if they fall outside the reimbursed indications for bariatric surgery.

The mean age for primary procedures was 44.4 years (± 11.6 SD). The mean BMI was 43.8 kg/m² (± 5.5 SD). [74] The most frequently performed (primary) procedures involved patients with a Roux-en-Y gastric bypass (RYGB) (66.9%), followed by gastric sleeve (GS) (24.7%), one anastomosis gastric bypass (OAGB) (7.9%) and other procedures (0.4%).[74]

An ongoing shift in the age distribution of bariatric patients can be observed. Bariatric surgery among older patients increased which can be explained through an increase in life expectancy, increase in prevalence of obesity, and the evolution towards metabolic surgery.[76]

5.2.2 The role of bariatric surgery centres

5.2.2.1 High volume centres

In the Netherlands, only 18[aa] out of about 85 hospitals perform bariatric surgery. This is the consequence of a policy (since 2010) of the health insurers to concentrate several types of surgery (e.g. complex cancer surgery) in high-volume centres. Bariatric surgery was concerned in 2011 on the request and initiative of the two professional organizations of surgeons ('Nederlandse Vereniging voor Heelkunde NVH' or the 'Dutch Society for Metabolic and Bariatric Surgery DSMBS'). All of the 18 hospitals performing bariatric surgery are non-academic teaching hospitals.[77] Some of these hospitals also offer other types of complex surgery (e.g. complex cancer surgery) while this is not always the case.[78]

The health insurers can selectively contract with healthcare providers based on cost, quality and volume. It is common practice that selective contracting criteria are based on criteria developed by the relevant scientific organisations. A national general agreement (on the level of the association of health insurers– Zorgverzekeraars Nederland) is made about a set of minima criteria under wich health insurers will not contract care. In addition insurance companies can set additional criteria which reflect their vision on a domain of care which are not necessary evidence-based. The minimal standards for bariatric surgery were defined by the DSMBS and approved by the Dutch Association of Surgery (Nederlandse Vereniging voor Heelkunde) (latest version, defined in 2019). (see text box 3)

Box 3 – Minimal standards NVH (June 2019)

- A dedicated ambulatory obesity clinic;
- A multidisciplinary intake, indication assessment and support prior to surgery;
- Availability of the following disciplines: at least 2 gastrointestinal surgeons, internist and/or endocrinologist; dietician; psychologist; nurse specialist and/or nurse practitioner;
- Endoscopy unit that is adequately equipped and with the availability of a day care centre for the surveillance of endoscopic procedures;
- The surgeon is part of an association with at least 2 surgeons that practice surgery on the upper gastrointestinal tract with sufficient experience and a certificate in gastro-intestinal surgery;
- At least two registered stomach/intestine/liver physicians (or endoscopic physicians) with expertise in interventional endoscopy (e.g. dilatation and stenting after bariatric surgery);

[aa] Note that recently two hospitals closed due to financial problems. The bariatric care programme was transferred to other hospitals.

- 24/7 availability of an interventional radiologist competent to perform interventions among patients with complications of major gastro-intestinal interventions;
- Concentration of specific/rare interventions in a limited number of centres.
- At least 200 interventions per year, per location;
- Interventions performed by a certified gastro-intestinal surgeon.
- The key-criterion for bariatric surgery is the volume of procedures per year per centre. This recently increased from 100 to 200 per year, per centre.[79] In addition, per centre, the surgery has to be performed by a minimum of two surgeons.[77] There are transitionary measures for hospitals that start to offer bariatric surgery (e.g. after a closure of the service in another hospital).[75]

Between 2015-2016, all bariatric centers met the quality indicator regarding (at that time) a minimum of 100 bariatric procedures per individual hospital, with a range of 171 to 1 153 procedures.

Not all health insurers contract all eligible centres. They specify additional criteria on which they decide to contract. We give the example of one health insurer (i.e. CZ groep, see text box 4) which differentiates the centres in several categories based on quality (see below) : best-performers (contracted and indicated as preferred centre); good performers (contracted) and bad performers (not contracted). Currently CZ contracts 17 centres (of which 11 are best performers). (https://zorgvinder.cz.nl)[75] Yet, when the DSMBS considers these additional criteria as unfounded they make a formal complaint against it.

There is one centre that performs bariatric surgery (LAGB) in patients <18 years in the context of a clinical trial about 20 per year.[80] The study protocol indicates that patients are 14–16 years old with sex- and age-adjusted BMI > 40 kg/m2 (or > 35 kg/m² with comorbidity). The surgery can only be undertaken if the child has followed (at least 1 year) a conservative weight loss programme in a specialised centre and failed to achieve weight reduction > 5%.[81] While the recruitment of patients is slow no immediate results are expected. Therefore, and because the intervention concerns LAGB (a technique that is less utilized nowadays) other bariatric surgery centres joined an international trial on the effectiveness of bariatric surgery among adolescents.[82]

Box 4 – Minimal criteria to be contracted for bariatric surgery by the CZ-group

- Registering data and make them available (at least 95% of all patients) to the bariatric registry (DATO)
- Volume-threshold per site: at least 200 yearly primary bariatric procedures per site. Only when the care is provided by the same multidisciplinary team and medical specialists on several sites of a same hospital the volume of the individual sites can be aggregated to meet the threshold. Otherwise the volume thresholds are applied at the site level. 75
- Volume-threshold per surgeon: at least yearly 30 bariatric procedures per surgeon.
- At least 2 bariatric surgeons: per site where bariatric surgery is performed there are at least two bariatric surgeons each performing at least two different types of bariatric surgery (of which one is R-en-Y bypass). This criterion is set because the choice for type of surgery is made on an individual basis.
- A multidisciplinary team: internal medicine with expertise in obesity; dietician; psychiatrist or psychologist; nurse specialist or nurse practitioner; surgeon who practices bariatric surgery; anesthesiologist with expertise in obesity.
- Multidisciplinary pre-surgery pathway: to assess if bariatric surgery is indicated and to exclude psychological contra-indications. Verify if patients have undertaken a serious weight loss attempt (i.e. a documented weight loss attempt of at least 6 months including the support of a GP or dietician to loose weight via increased exercise and adapted diet) .

- Multidisciplinary post-surgery pathway and follow-up[75] with a duration of at least 3 to 5 years: The multidisciplinary pathway includes: consultations with the surgeon and, if required, with the internal medicine physician; multidisciplinary support to maintain good lifestyle habits (physicial exercise and diet) during the first three years; thereafter long-term follow-up
- The criteria of the CZ-group are supplemented with quality indicator requirements

5.2.2.2 Organisation pre- and post-surgery pathway:

The pre-surgery pathway is organised by the bariatric surgery centres. The Dutch Association for Surgery (NVH) describes the minimal criteria for bariatric surgery including criteria concerning the pre-surgery phase. These include the multidisciplinary intake, indication assessment and support prior to surgery. It is specified that the team should have to its availability at least two gastro-intestinal surgeons, a physician in internal medicine and/or endocrinologist, a dietician, a psychologist and a specialised nurse and/or nurse practitioner. Nevertheless, despite this guidance variation across centres in the organisation of the pre- and post-surgery pathway exists. This variation concerns, a.o. the frequency of appointments, the disciplines involved and the costs.[83, 84]

The professional organisation of psychologists recently published a guideline concerning 'Bariatric psychology'.[85] This guideline acknowledges the importance of a psychologist in the diagnostic work up and the treatment. Yet until today, the role and function of psychologists in bariatric care is scarcely described.[85]

In 8 bariatric surgery centres the pre- and post-surgery pathway is outsourced to one company called 'The Nederlandse Obesitas Kliniek (NOK, Dutch Obesity Clinic)'. The NOK is owned by a private for-profit company. The pre-surgery pathway in the NOK includes a mandatory attendance on an information group session. Then the patient is screened (on an individual basis) by a physician, psychologist, dietician and exercise therapist. The result of this screening is discussed with an internist and bariatric surgeon (30% on average are not accepted for surgery because they do not meet the criteria for surgery or have contra-indications such as eating disorders or psychopathology)[80]. When patients are accepted for surgery, they start the treatment program, which is carried out by the multidisciplinary team. The focus of the NOK-programme is on group counselling (about 6 pre-surgery and three during the first 1.5 year post-surgery).[86] The aim of the group counselling is on achieving long-term behavioural changes. Also aspects such as the causes of obesity, coping strategies and improvement of self-care are part of the program.[86] The approach of NOK with a lot of group sessions is very efficient (a high number of patients can be educated in a short time window) and might work well for the bulk of the patients. Yet, individualized care is provided to patients that are in need of tailored individual care.

A yearly follow-up with the multidisciplinary team is compulsory proposed to all patients, starting 2 years after surgery and ending at 5 years after surgery..

The contracts between the bariatric surgery centre and the health insurer cover the services included in the pre- and post-surgery pathway. These contracts are based on volume, cost and quality criteria. As such bariatric surgery centres have an incentive to be efficient (e.g. group session approach, follow-up of stable patients by nurse specialists instead of a physician) but also to provide quality (e.g. health insurers will stop contracts when quality is poor). Since not all patients are in need of the same care package these contracts are often kind of a 'bundled payment' with which the centers can provide care (e.g. a psychologist and dietician are included in the contract but not all patients receive psychological support).

5.2.3 Role of GP's

In the Netherlands the GP has, in general, a gate-keeping role. Also for bariatric surgery most patients are referred by a GP (in line with the indications for surgery: see section 5.2.1) to the bariatric surgery centre. The guideline for GP's stipulates that bariatric surgery is a second line treatment. An exception is the patients with a BMI of >50 where it can be considered as a first line treatment. Bariatric surgery among children can only be considered in the context of research.[87] In addition, also other medical specialists (e.g. orthopedic surgeon) refer patients for bariatric surgery.

The role of the GP prior to the operation is thus mainly to provide conservative treatment for obesity. In case this is ineffective, the GP is responsible for adequate referral and to give correct information to the patient. The preparation for surgery is given by the bariatric surgery centres.

During the post-operative phase the role of the GP is limited to motivate the patient to comply with his therapy and to adhere to the follow-up appointments in the bariatric surgery centres. The post-surgery follow-up is provided by the bariatric surgery centres. After five years the follow-up is handed over to the GP. It is important that during this long-term follow-up the GP sees the patient at least once a year and checks if the patient can adhere to the necessary lifestyle changes, continues to take the vitamin supplements, performs lab tests, …

5.2.4 Registry

Mandatory nationwide registry

In the Netherlands bariatric surgery centers have, since 2015, the obligation (imposed by the health insurers as a prerequisite to perform bariatric surgery, but the initiative for this mandatory registry was taken by the Dutch society for Surgery 'Nederlandse Vereniging voor Heelkunde') to participate on a nationwide registry named DATO (Dutch Audit for Treatment of Obesity). The mandatory nature of such a registry is important to reduce the risk of selection bias and intention-to-treat confounders from individual hospitals and to enable valid conclusions and feedback.[72, 88] A verification of this requirement by a third-party shows that centres comply with this obligation. An inclusion rate of 99.9% of all patients who undergo bariatric surgery in the Netherlands is observed.[88]

Governance structure and funding

The DATO is a registry organised by a non-profit organisation called the Dutch Institute for Clinical Auditing (DICA). The DATO is one of the more than 20 nationwide registries that are organised by DICA.[89] Nationwide coverage is enforced via the Association of Surgeons of the Netherlands (and the Dutch Society of Metabolic and Bariatric Surgery in particular), the umbrella organization of Dutch health insurers, and the Dutch National Health Care Institute.[72] Initial project funding to set up the registry was provided by the organization of health insurers (ZN). Nowadays ZN finances the DATO-registry structurally.

The DATO-registry is governed by a scientific committee (with representatives from all bariatric surgery centres) and a clinical audit board (CAB) to oversee the long-term goals of the registry and to monitor its quality. Three members of the scientific committee are mandated into the CAB. The CAB consists of a chairman, a secretary, and a treasurer and is responsible for day-to-day running of the registry. Any decision taken by the CAB must be officially reported to the scientific committee. All participating hospitals have thus an influence on the decision making process.[72]

Content

The content of the DATO-registry resembles that of other nationwide registries such as the SOReg from Sweden (and Norway).[88] It contains data about:

- patient characteristics (unique identifier, date of birth, sex, a live/death status);
- screening results (weight at baseline and follow-up (FU), highest weight, length, hypertension at baseline and FU, diabetes mellitus at baseline and FU, dyslipidemia at baseline and FU, GERD at baseline and FU, OSAS at baseline and FU, muskuloskeletal pain at baseline and FU, Charlson comorbidity index);
- abdominal history (sub-scales to be completed when present),
- bariatric history (year of operation, type of surgery, type of technique, hospital);
- procedure (date of operation, surgeon, ASA-score, type of procedure, Clavien-Dindo Classification of Surgical Complications);
- follow-up (evaluation of co-morbidities, complicatons during previous period; patient-reported outcomes measurement-PROM (RAND-36 which is a generic PROM).[72] The PROM-indicator is currently being updated and will be replaced by a more bariatric specific PROM.

The DATO contains data until five years after surgery (generally one registration per year).

Data entry and audit

Data entry is done by the surgical department (or the NOK if the surgical centre decided to sub-contract another organisation for the follow-up care). This can be done in batch (extract from electronic patient record) or via a secure web-based registration interface. For the moment there is still a separate database in which data about the patient reported outcomes are collected. This separate database can be linked to the DATO-registry and will in the future be integrated.

A unique identifier (social security number) ensures that data can be treated at the patient level and (potentially) be linked to other data sources. To ensure privacy of the patients a data processing company anonymizes the data before analyzes take place.

Several pre-cautions and mechanisms are set in place to ensure that the quality of the data is high: e.g. clear definitions of all variables, error message in case data entry values are outside a predefined ranges, automatically generated lists with missing values for mandatory data fields, audit, etc. An audit is performed by an external company once every 2 years in a randomly chosen selection of hospitals. The data registered in DATO are verified by trained DATO-coders by comparison to the patient records.[72]

The data dictionary can be downloaded via the website of DATO (https://documents.mrdm.nl/showcase/downloaden#).

Quality Indicators and feedback

Each year a list of 'external quality indicators' is defined based on a concertation process including the DATO's scientific committee, professional societies, hospital organizations, Dutch Patient Federation, and the health insurance companies.[72] The list encompasses structure indicators (e.g. volume of bariatric surgery per year); process indicators (e.g. the completeness of registered variables, correctness of the individual indication for bariatric surgery, and the lost to follow-up); and outcome indicators (e.g. percentage of patients with severe complications; percentage of patients with an excess weight loss of more than 50%).[72] The quality indicators are also used by the Healthcare Inspection to perform targeted inspections (based on outlying values: both positive and negative).[90] The results per hospital are publicly available[91] and there is also a general report. From the indicators set in 2017 it appeared that there were substantially less patients in three hospitals, all three hospitals having post-operative follow-up adherence of less than 40%.[92]

Hospitals have access to their own data and can benchmark themselves with the other centres. Via a dashboard (with weekly updates) hospitals indicator results are made available. On a funnel plot the position of each hospital is (anonymised) depicted with an indication of the place of negative and positive outliers. As such hospitals have information at their disposal that can initiate quality improvement initiatives.

A list of indicators can be found on the website of DICA: [93]

Selective contracting

The quality indicators are also used by the health insurers in the context of selective contracting. In 2019, for instance, CZ categories bariatric surgery centres based on the following indicators:

- Structure indicators: Volume per site and surgeon.
- Process indicators:
  - Indications: At least 90% of the operated patients fits within the indication criteria as defined by DATO. Hospitals with a score of ≥95% are labeled as 'best care'. A score below 90% is considered as a 'fail'.
  - Drop-out during the first year post-surgery. To receive the label 'best care', the drop-out has to below 10%.
- Outcome indicators:
  - Mortality: Given low prevalence of mortality post-surgery this indicator is not taken into account to categorize bariatric surgery centres.
  - Complications: The complication rate after surgery is 6% or lower in all bariatric surgery centers which is in line with international literature. Centres below 6% are labeled as 'good care'. The CZ assesses a complication rate of 2% (95% confidence intreval) or below as 'best care'

- Re-intervention within 30 days. The labellization is the same as for complications.
- Excess Weight Loss after the first year post-surgery. When hospitals have 70% of more of their patients that achieve an EWL-score (Excess weight loss) of at least 50%, they are labelled as 'best care'. Other hospitals are categorized as 'good care'.
- Other indicators that in the near future might be considered are a PROM (e.g. Quality of life), medication use, etc.[83]

The CZ group agrees that the agreed volume increases for centres that perform as a 'best hospital' on EWL, drop outs, etc. In addition, they will be shown first in the list in the 'care finder' application. Other hospitals (that meet the minimal criteria) fall under the regular contracting agreements.[83]

Some results

The DICA-yearly report shows that the number of primary interventions increased from 8 658 in 2015 to 10 655 in 2017. The number of surgical revisions decreased from 1 613 in 2015 to 1 428 in 2017.

In 2017 96% of primary surgeries did meet the DATO-indications for surgery. Only 2.1% drop-out of follow-up after the first year. After the second year this is already 27%. The follow-up adherence is, despite the absence of (financial) patient responsabilization measures[bb] quite high in an international perspective.

The percentage of patients achieving an EWL% of 50% or above after year 1, is 78% for sleeve gastrectomies and 90% for gastric bypass surgery. After the second year this is 76% for sleeve gastrectomies and 88% for gastric bypass surgery.{DICA, 2018 #126}

The 2017 data were also included in a recent benchmark with Sweden and Norway.[88] This study showed that on average, for the three countries, the postoperative complications were present with 2.6% of the patients after Roux-en-Y bypass and with 2.4% after sleeve gastrectomy. In the Netherlands postoperative complications were reported for 2.4% of patients undergoing Roux-en-Y bypass and 3.3% after sleeve gastrectomy.[88] A weight loss of 20% or more was reported (for the three countries) to be reached for 95.8% of patients undergoing bypass and 84.6% of patients undergoing SG.[88] for the Netherlands this was the case in 90.8% of the sleeve gastrectomies and 96.3% of the RYGB patients. For other outcomes no country specific data was reported. For instance, it was reported that the lost-to-follow-up after 1 year was 12.1% after sleeve gastrectomy and 16.5% after Roux-en-Y bypass. Only for Sweden nationwide data were reported (i.e. 11.9% for RYGB and 20.1% for SG).

5.2.5 *Body contouring surgery*

In the Netherlands there are restrictions for reimbursement of post bariatric body contouring surgical (BCS) procedures:

- at least 18 months post bariatric surgery,
- a stable weight for at least 12 months,
- a BMI < 35 kg/m2.
- a skin excess grade 3 according to the Pittsburgh Rating Scale (PRS) or an untreatable skin condition caused by the excess skin.86

It should be noted that PRS was not developed for reimbursement purposes and is considered as not suitable for bariatric surgery patients. The psychological/physical burden is, for instance, not taken into account.[86] The result of the current system is a growing population of patients who have undergone bariatric surgery, but have no access to post-bariatric BCS. Patients who have the financial means can opt to undergo surgery at their cost. Unfortunately, no exact figures are available for the Netherlands.[86]

[bb] On the contrary the patient has to pay a personal financial contribution when they attend follow-up appointments. In fact, the follow-up appointments are counted in the 'eigen risico' (this is an amount paid by the insured in case they utilize care. This amount of 385 € has to be paid by the insured to be eligible for reimbursement of care services).

5.3 England

5.3.1 *Criteria for reimbursement bariatric surgery and utilization rates*

In this section we describe the eligibility criteria for bariatric surgery as defined by the UK National Institute for Clinical Excellence (NICE) as well as the criteria used in the NHS to commission these services. NHS funding is a complex issue. As described below, it is not necessarily the case that the guidelines of NICE are translated in funding. What's more regional differences exist in funding arrangements.

NICE-guidelines

Bariatric surgery is included as a treatment option in the NICE-guidelines for obesity. The first guideline dates back to 2006. In 2014 the NICE-guidelines were updated. The current NICE guidelines recommend bariatric surgery as the option of choice for patients with a BMI above 50 kg/m² regardless of whether they have tried lifestyle or drug interventions (first line treatment).

For those with a BMI between a BMI above 40 kg/m², the recommendation for surgery (second line treatment) is dependent on other factors, such as:

- the person is already being (or will be) treated in a specialist weight management service (see below in section 5.3.2 for these specialised services, called 'Tier 3') and
- all appropriate non-surgical measures (usually behavioural interventions and potentially pharmacological interventions) are tried without (sustainable) weight loss.

Patients with a BMI between 35 and 39.5 kg/m² can be operated if they fill the two criteria above and if they suffer from other significant diseases (e.g. type 2 diabetes, high blood pressure).

For all patients undergoing bariatric surgery it is recommended that they are fit for anaesthesia and surgery, and that the person commits to the need for long term follow-up. The preoperative assessment before surgery should include a risk-benefit analysis with prevention of complications of obesity (such as type 2 diabetes, hypertension, obstructive sleep apnoea, and gastro-oesophageal reflux), assessment of eating disorders, and assessment of psychological or clinical factors that might affect adherence to postoperative care. Multidisciplinary teams should be able to conduct preoperative assessments, give psychological support before and after surgery, and provide postoperative assessment and surgical follow-up (for two years). After discharge from bariatric surgery service follow-up, the centres should ensure, as part of a shared care model of chronic disease management, that all people are offered at least annual monitoring of nutritional status and appropriate supplementation according to need following bariatric surgery.

Compared to the 2006-guideline, the 2014 guideline also states that for patients with recent-onset of type 2 diabetes (within the last 10 years) and a BMI of 30–34.9 kg/m² bariatric surgery is an option and an assessment can be considered. Moreover for patients with diabetes and a BMI above 35 kg/m² an expedited assessment is recommended. For patients with diabetes and an Asian ethnic background bariatric surgery should be considered at a lower BMI than other populations.

Surgical intervention is not generally recommended in children or young people.

Bariatric surgery may be considered for young people only in exceptional circumstances, and if they have achieved or nearly achieved physiological maturity.

Revisional surgery (if the original operation has failed) should be undertaken only in specialist centres by surgeons with extensive experience because of the high rate of complications and increased mortality. The guidelines also state that bariatric surgery centres should submit data for a national clinical audit scheme. [94-96]

Commissioning bariatric surgery and criteria for reimbursement

The way services are commissioned within the NHS was drastically reformed over the last decade. These important changes in the commissioning of services in the NHS have also had a substantial influence on bariatric surgery services.

Before April 2013, GP primary care trusts (PCTs) were responsible for having an obesity strategy and the commissioning of weight management services. Yet, bariatric surgery was excluded since these bariatric surgery was commissioned at regional level by 10 specialised commissioning groups (SCGs). These SCGs had the authority to designate providers to specific specialised services. Although, the ten SCG's developed a national standard to support this designation each SCG could define the local criteria for eligibility for NHS bariatric surgery. As a consequence, regional variation was observed. In some areas no bariatric surgery for patients with severe and complex obesity was provided while in other areas referral criteria were specified such that severely limited those patients who might be able to access it, even if meeting clinical need. [97]

With the introduction of the Health and Social Care Act (2012) the primary care trusts and specialised commissioning groups ceased to exist from April 2013. Yet, other pre-existing challenges remained (e.g. geographical variation in the provision of bariatric surgery). From April 2013, the NHS Commissioning Board has provided guidance on one national contract for the provision of bariatric surgery in England, to be delivered by any provider that meets the strict service specification. Among other things, this document outlined the arrangements for funding of bariatric surgery for the population of England, and was intended to define and clarify the eligibility criteria at a nationwide level. The recommendations on who should be considered for bariatric surgery and what criteria should be met by the bariatric surgery centres were in line with the NICE guidelines.[97] In first instance, 'bariatric surgery' was considered as a 'specialised service' commissioned by NHS England at a national level. Yet from April 2017, it became the responsibility of the clinical commissioning groups (CCG's). Although a national guidance document for commissioning exists geographical variation still remains. According to the Royal college of Surgeons, several NHS commissioning groups (CCGs) have adopted policies which attempt to ration weight loss surgery to people with severe and complex obesity, and ignore official advice on who should be eligible for surgery.[98] Some CCGs, for instance, either require patients to stop smoking or for patients to have a Body Mass Index (BMI) of over 50.[98] Commissioners have also restricted the number of bariatric operations they will fund, despite the evidence of cost saving.[99] The British Obesity and Metabolic Surgery Society (BOMSS) indicates that failure to provide a clear rationale for deviating from NICE guidance could potentially leave CCGs open to legal challenges. [100]

Utilization of bariatric surgery

In 2016, in England 26% of men and 27% of women have obesity (defined as BMI of 30 kg/m² or above).[101] These figures are high in an international perspective.[102] In contrast, bariatric surgery utilization rates are much lower compared with most industrialised countries. In England (2017/18) 6 627 (6 109 primary procedures) bariatric surgery procedures for obesity were performed by the NHS. This corresponds with 12 admissions per 100 000 population.[103] Over the past 5 years this number varied around 6 000 per year which is much lower than the nearly 9 000 bariatric surgery operations reported earlier (2011/12).[104] These figures do not include procedures that are performed outside the NHS (self-funded, private clinics, abroad) for which no official statistics are available.

This low utilization rates of bariatric surgery in a country with a high prevalence of obesity suspects unmet needs. Indeed, a study by Ahmad (2014)[105] showed that, based on the 2006 NICE-guideline, more than 2 million people could be potentially eligible for bariatric surgery in the UK (not restricted to England). This clearly shows that the demand far exceeds the capacity to provide the treatment. A recent study re-calculated this by using the expanded eligibility criteria of the NICE-2014 guideline. Results show that under the current NICE guidelines for obesity, an estimated 3 623 505 or 7.78% (95% CL 7.07–8.58) of the population could potentially be eligible for bariatric surgery compared with 2 717 861 or 5.84% of the population under the previous guidance (95% CL 5.21–5.54).[94] It should be noted that the calculation assumes that those in the BMI 35–40 category have attempted weight loss already through non-surgical means. Yet, it is unlikely that many had.[94] Moreover, not everyone who is eligible for bariatric surgery should necessarily be operated (e.g. contra-indications, patient preference). Nevertheless, with such a low number of bariatric surgery procedures performed, there is a large difference between potential treatment demand and the use of bariatric surgery. Desogus et al. (2019) [94] calculated that the penetration rate for bariatric surgery in the UK (not only England) was 0.002% which is much lower compared to international reported figures (range 0.5-1.2%). Moreover, there is also a potential health inequality

between who requires surgery and who receives surgery, with females receiving a disproportionate number of the available surgeries.[94]

Guilford et al. (2017) showed that case-mix of bariatric surgery between 2002 and 2014 changed. The proportion of women declined from 86% to 75% and the mean age at operation increased from 43.4 to 46.8 years. Also the proportion of patients with diabetes increased from 19% to 33%.[106] The use of GBP and SG increased over time while LAGB declined. During 2012-2014 GBP accounted for 55% of procedures, while SG accounted for 25% and LAGB for 20%.[106]

5.3.2 *The role of (bariatric surgery) centres*

Bariatric surgery is a specialised service that can only be accessed when conservative treatment has been followed.

Obesity care in England is organised via a 4-tier system. Tier 1 is public health messages about healthy eating and activity, environmental and population initiatives. Tier 2 concerns primary care activity (e.g. GP, health visitor) and community weight management services (including commercial slimming). Tier 3 services consist of an intense weight-loss programme, supported by dieticians and specialists in obesity who supervise patient progress. Tier 3 services largely consist of community-based services, where patients are referred to by GPs but can also be hospital-based. Yet, the tier-3 services are not commissioned in a consistent way which created confusion for surgeons and hospitals about whether patients have gone through the correct pathways of care (i.e. Tier 3 is mandatory in the care pathway prior to bariatric surgery[cc]), and can therefore access surgery.[100] In a Tier 3 service, nutritional assessment and screening and also interventions are undertaken to improve diet and support behavioural and lifestyle changes (by a specialised dietician) and physical activity of referred patients. A screening for hormonal or genetic causes of excessive weight, as well as all related comorbidities and disabilities is conducted by the bariatric physician. In addition also a screening for signs of psychiatric comorbidities and eating disorders is undertaken and work is done to improve medical and psychological co-morbidities, etc. When patients have engaged with the programme and when they comply with the eligibility criteria for surgery they will be advised to progress towards the Tier 4 bariatric surgical intervention.[104]

In practice, in many centres, there is a blurred distinction between tier 3 and tier 4 since many share the same personnel, in an attempt by clinicians to create workable services in the absence of active commissioning.[97]

Bariatric surgery centres

The commission guidance provides some criteria for the tier-4 centres. These are largely based on the IFSO-criteria and include:

- A minimal volume of operations per year. The IFSO-standard of 100 per hospital and 50 per surgeon is adopted. The guidance states that this is really a minimum to meet quality standards and advise to aim for larger volumes.[107] An additional argument to commisison high volume providers, is that higher volumes can facilitate sustainable levels of funding to support infrastructure development (nurses, dieticians, psychologists), and they allow a number of surgeons to take part in an on call rota.[107] It is unclear how these volume thresholds are implemented. Yet, when consulting the publicly reported volumes per surgeon (period 2014-2017) it appears from the distribution that 50% of the surgeons are below 75 operation (equals 25 operations per year). The reason why the volume standards are not strictly applied is the overall low number of bariatric surgery procedures that is performed (and therefore only a limited number of centres attain these standards). If the volume standards are strictly applied the accessibility of bariatric surgery would further decrease.

[cc] If patients successfully lose weight during their time in tier 3, or the final pre-operative period, and their BMI falls below the CB criteria, then bariatric surgery is not expected to proceed, reflecting their success. Whether surgery does proceed or not is based on the BMI at the time of entry to tier 4. Many tier 3 clinics have regarded this practice of withholding surgery from those able to demonstrate weight loss as discriminatory, and do refer on to tier 4 surgery clinics if the BMI falls below the NICE threshold in the period in tier 3.[97]

- Appropriate Tier 3 and 4 multidisciplinary composition ensures that specialist multi-professional inputs and process design are available for all stages of the pathway.[107]
- During the pre-surgery phase the diagnostic work up, pre-operative evaluation, risk stratification and provision of counselling, education and information is undertaken by a dedicated multidisciplinary team which is specialised in the management of severe and complex obesity. This team includes: surgeons; anaesthetists; physicians; psychologists (to provide assessments and targeted interventions); dieticians; nurses; radiologist; dedicated administrative support; access to psychiatry, pharmacists and physiotherapists or sports and exercise medicine specialists who have a special interest in bariatric surgery. This team should also have links to independent patient support groups and also provide support and facilities for in-house patient support groups.[107]
- The organisation of structured, systematic and team based follow up for 2 years. The postoperative follow-up includes: dietary advice and support with behaviour changes, the monitoring of weight loss and comorbidity, monitoring of micronutrients, outcomes, complications and adherence (e.g. supplements); psychological input; management of comorbidities; and liaison with general practice.[107] Just before the 2-year period ends, the surgical provider will make arrangements to hand over and share care and follow up with primary care.[107] Yet, although shared care was recommended by NICE, in practice this is not implemented as such. Specialized care often, already during the first two years, write to the GP after each appointment. In addition, most centres will write after two years a discharge letter to the GP asking them to check annual bloods and refer back if concerns. Yet, there is, in general, no joint care.
- The collection and submission of data to the National Bariatric Surgical Register is mandatory. [107]

Complex revisional surgery is concentrated in a limited number of centres with specific expertise (e.g. nutritional teams with experience in severely malnourished patients, 24/7 access to emergency and critical care, radiology specialist with a special interest on obesity surgery). Moreover, it is specified that the surgeons have a personal lifetime experience of at least 500 cases in the NHS (and documented in NBSR).[108]

5.3.3 Role of GPs

General practitioners (GP)'s play a pivotal role in the management of obesity. Yet, GPs cannot refer patients directly for bariatric surgery. The GP has to refer patients to specialised intensive weight management services (Tier 3), who (in case patients are eligible) can refer patients for surgery assessment (Tier 4). This creates an additional barrier to access bariatric surgery and is seen as one of the reasons why bariatric surgery utilization rates in England are low.[99] The role of GPs in the pre-surgery pathway is thus rather in-direct. Nevertheless, they have an important influence on the care pathway of people with obesity. A recent survey among GP's illustrated that GP's have low referral rates (only 50% of patients that contact them regarding bariatric surgery are referred for assessment) for weight loss surgery (via a weight management clinic), there is a lack of confidence and support among GPs for bariatric surgery and they are not well informed about the risks (e.g. overestimate post-surgical mortality) and benefits.[109]

Given that the follow-up care is led by bariatric surgery centres during the first two years post-surgery, the role of GPs is limited to recognising potential signs and symptoms of complications (sometimes also responsible for lab testing). Guidance for GPs exist about the type of complaints for which a referral (ranging from emergency to routine follow-up) is required.[110] Also guidance on routinely follow-up exists (see text box).[111] The vitamin supplements are also paid from the GP's budget. Some CCG's do not allow GPs to prescribe vitamin supplements. As such geographical variation in the use of vitamin supplements might be induced.

Box 5 – Ten Top Tips for the management of patients post-bariatric surgery in primary care

1. Keep a patient register;
2. Patients should check their weight regularly and attend an annual diet review;
3. Severe gastrointestinal signs require emergency readmission to surgery;
4. Continue to monitor obesity comorbidities and mental health;
5. Review medications;
6. Lifelong annual blood tests are required;
7. Be aware of the nutritional deficiencies that can occur;
8. Ensure that patients take the appropriate nutritional supplements;
9. Discuss contraception and try to avoid pregnancy in the first 12–18 months;
10. Supplement regimens should be altered in cases of subsequent pregnancy.

Source: Paretti et al. (2015)[50]

5.3.4 Registry

Initiative from professional organisations of surgeons

The United Kingdom (UK) National Bariatric Surgery Registry (NBSR) is an initiative of professional organisations (the British Obesity and Metabolic Surgery Society; the Association of Laparoscopic Surgeons of Great Britain & Ireland, and the Association of Upper Gastrointestinal Surgeons). It was set up in 2008 (went live from January 1st 2009) in partnership with Dendrite Clinical Systems Limited (a private organisation organising other clinical registries such as the breast cancer registry, cardiac surgery registry). The Association of Laparoscopic Surgeons of Great Britain & Ireland provided seed funding.[112] Dendrite also accommodates, in collaboration with IFSO, the collection of data from several countries (national and non-national registries).[102]

Mandatory but no public funding provided

Submission of data to the registry is mandatory according to the commissioning standards since 2013[107, 113], recommended by NICE and included in the professional standards of bariatric surgeons. Whilst submission of data for privately funded patients is not yet mandatory, the NBSR also includes data of privately funded operations (e.g. with a higher proportion of LAGB and a lower proportion of GBP compared to publicly funded operations).[114]

Apart from a small grant there has been no offer of public funding for the registry whose day-to-day administration was taken over by BOMSS in January 2014. On a hospital level a lack of administrative support to assist surgeons in assuring data quality (missing records, incomplete records and erroneous data) is reported. Also capturing data from follow up beyond 2 years is problematic.[114]

Web-based data entry with quality checks and public reporting in case of high data incompleteness

Submission of data is done via web-based application that can be accessed via a unique password protected ID for registered surgeons and their named delegates. Each user sees only their own data and access to the database as a whole is restricted to system administrators. Data are typically collected and submitted during routine clinical visits pre- and postoperatively.[112] There are some fields that need to be completed to obtain a 'green light' submission. If data are missing then the data record will be highlighted in yellow. The fields are:

- Initial information
  - Weight
  - Height
  - Hospital name
  - Funding Category

- Baseline comorbidity
  - ASA grade
  - Type 2 Diabetes and duration (where applicable)
  - Hypertension
  - Cardiovascular
  - Sleep apnoea
  - Asthma
  - Functional Status
  - Known risk factors for pulmonary embolus
- Operation Record
  - Type Of Operation (Primary, Revision or Planned Second Stage)
  - Operative approach (Laparoscopic, Lap converted to Open, Open, Endoscopic)
  - Operation (select relevant choice)
  - For Revisions Prior Operation Type (where applicable)
- Post-op course and discharge
  - Cardiovascular complications
  - Other complications
  - Discharge date
  - Discharged destination

Surgeons that are negative outliers (regarding data entering completeness) receive a letter from the BOMSS and are reported with their name on the website.

Reports about key figures

The most recent publicly available report published by the NBSR includes data from 218 consultants and 165 hospitals totalling 21 436 operations (78.9% were publicly funded, 21.1% were funded via other means) in the three financial years ending 2015-2017. Of the operations in 2015-17, 10.1% were gastric bands; 45.4% Roux en Y gastric bypass; and 36.0% sleeve gastrectomy.[115] It should be noted that the NBSR includes data from the entire UK.

Yet, in a separate report, data on England are reported. It was stated that all hospitals that perform bariatric surgery submitted data. It concerns data from hospitals that were either a NHS hospital or a private hospital in case this was used to provide additional capacity for the NHS bariatric units. The data shown are those of surgeons currently practising within the NHS and excludes retired surgeons.[115]

Table 25 – Data about the English bariatric surgery registry

Year	Surgeons submitting data	Hospitals	Operations recorded *	Primary operations	Revisions** (total)	Major revisions
2012/13	120	74	5 528	5 192	336 (6.1%)	115 (2.1%)
2013/14	139	69	5 729	5 297	432 (7.5%)	167 (2.9%)
2014/15	140	70	5 671	4 989	682 (12.0%)	299 (5.3%)
2015/16	146	65	5 704	5 056	648 (11.4%)	263 (4.6%)

include primary and secondary operations (also minor revisions that might by the 'Hospital Episode Statistics' not be detected as a bariatric surgery intervention).weight regain is not a valid reason for revisional surgery in England.*

A summary of some key figures for the years 2013/16 were reported. The average BMI was 49.1 kg/m² and the average weight was 136.4kg. 75.9% were female and average number of obesity related co-morbidities (e.g.

diabetes, hypertension) was 3.6 per patient. There were 8 recorded deaths (0.05% in-hospital mortality) and the average length-of stay was 2.6 days.

The most recent NBSR report (whole UK) also includes information about percentage weight loss (average PWL greater than 30.1% : 16.3 % for gastric banding, 33.1% for Roux-en-Y gastric bypass and 28.5% for sleeve gastrectomy); functional impairment (58.3% of patients with functional impairment pre-operatively had returned to a state of no impairment one year post-operatively); co-morbidities (53% of patients with sleep apnoea were able to come off treatment; 51.6% of patients with Type 2 diabetes returned to a state of no indication of Type 2 diabetes). [115] The third NBSR report will also include HbA1c and EQ5D quality of life measurements. [115]

Public reporting of data on hospital and surgeon level

The outcomes of hospitals and surgeons are publicly reported on the website of BOMMS (http://nbsr.e-dendrite.com/) and NHS choices (https://www.nhs.uk/service-search/Bariatric-surgery/London/Results/1033/-0.085/51.511/448/13136?distance=25).

For 2015/16 the hospital outcomes on NHS Choices include: total number of operations; proportion primary vs major revision vs minor revision; data completion rates ('green for complete'); In-hospital mortality.

5.3.5 Body contouring surgery

Body contouring surgery was formerly funded by the PCTs and is now commissioned by CCGs. There exists variation in the access to body contouring surgery after bariatric surgery. In 2014, NICE-accredited national commissioning guidelines were prepared by the Royal College of Surgeons and the British Association of Plastic, Reconstructive and Aesthetic Surgeons.[116] These guidelines incorporate the use of a referral pathway initiated by the GP in primary care. General criteria for body contouring surgery are:

- Age over 16 years;
- Starting BMI over 40 kg/m² or above 35 kg/m² (with co morbidities) AND current BMI of less than or equal to 28 (exception: 75% excess body weight- are eligible for an interim apronectomy, if unable to slim down to a BMI of 28 kg/m²);
- Weight stability of 12 months and significant functional disturbances (both physical and psychological).116

The uptake of this guideline is limited. A survey among CCG's indicates that only 6 out of 108 CCG's that completed the survey (on a total of 211 CCG's) mention that they implemented the guideline. A total of 81 CCG's indicated that they used local funding guidelines while 15 CCG's indicated that they funded based on individial request. As such despite the existence of a national guideline, the access to body contouring surgery after bariatric surgery continues to vary.[117]

5.4 France

5.4.1 Criteria for reimbursement of bariatric surgery and utilization rates

Criteria for reimbursement

The eligibility criteria for the reimbursement of primary bariatric surgery in France are based on the HAS 2009 guidelines on weight loss surgery.[118]

In order to be eligible for bariatric surgery, adult patients need to meet all of the following requirements:

- A body mass index (BMI) of ≥ 40.0 kg/m^2, or a BMI ≥ 35.0 kg/m^2 in combination with at least one comorbidity that is likely to improve following surgery: in particular high blood pressure, obstructive sleep apnoea syndrome (OSAS) and other severe respiratory disorders, severe metabolic disorders, in particular type 2 diabetes, incapacitating joint disorders, non-alcoholic steatohepatitis (NASH).
- Attempt to lose weight without success by non-operative means (medical, nutritional, dietetic and psychotherapeutic treatment) properly conducted for 6-12 months.

- A multidisciplinary preoperative assessment and management with a team composed by at least one surgeon, one physician specialised in obesity (physician-nutritionist, endocrinologist or internist), one dietician, one psychiatrist or psychologist and one anaesthetist.
- Being well informed and having understood and accepted the need for lifelong medical and surgical follow-up.
- Acceptable operating risk.

Additionally there should be no absolute active contra-indications for bariatric surgery.

A HAS GCP guideline from 2016 stipulates that adolescents constitute a distinct population where bariatric surgery should be avoided and remain very exceptional (only possible in exceptional situations of complex obesity) by limiting interventions, to specialized facilities (not otherwise specified; there are no official criteria yet) and with provision of very close monitoring. Currently around 100 minors undergo BS on a yearly basis, and although it seems that it is only performed in a few specialized centres, there is actual concern and vigilance that this surgery might become applied in minor adolescents on a larger scale and in more centres.

For candidates aged between 18 and 60 years, agreement (green light) is given quasi-automatically for the procedures approved by HAS (banding, sleeve, bypass and biliopancreatic derivation) as in practice no upfront individual 'manual' verification is made (because of a lack of resource). This access procedure for bariatric surgery for adults[dd] does not allow to obtain reliable data on the proportion of cases where the indication setting might not be appropriate (= not in line with the official reimbursement conditions for bariatric surgery). Yet, there is suspicion that the criteria are not respected in all cases as shown by the substantial but transient drop in bariatric interventions (-38%) observed between 2002-2003 during a temporary 'control' campaign applied by the health insurance body (all requests were checked at an individual level).[119]

Utilization of bariatric surgery increases

After a steep increase in the years 2000, the prevalence of obesity in France has stabilized at around 17% (2015), a figure comparable to the situation in Belgium.[119]. In 10 years the number of bariatric procedures has tripled until reaching ca. 50 000 per year since 2016.[119-122] This increase may find its origin in a combination of factors like an increase in needs, the wide and rather liberal accessibility of the offer and the attractiveness of the intervention.[119] There was a significant drop in the number of LAGBs vs a high increase of SGs and a lower increase of RYGB[ee]. In 2018, the SG (69%) and the by-pass (28%) are the most frequent interventions.[120]

Taking into account the number of patients who underwent bariatric surgery between 2005 and 2016, and taking the assumption that the number of bariatric surgeries would have remained stable from 2017 to June 2019, at least 570 000 patients would have undergone bariatric surgery in France in the period between 2005 till June 2019.[119, 121, 123] Based on a population of almost 67 million inhabitants, this would bring the estimated prevalence rate to 0.9%. France together with Belgium and Sweden belongs to the top list of countries having the highest utilization rates of bariatric surgery.[124]

[dd] Agreement for reimbursement of bariatric surgery is requested from the public health insurance body by the bariatric surgeon by filling in an online request form.

[ee] The OAGB (One Anastomosis Gastric Bypass or so-called the "mini-gastric bypass" or omega gastric bypass) has until nowadays been reimbursed under the 'same umbrella' code as the RYGB, so that 'administratively' no distinction could be made based on reimbursement codes. However the HAS currently recommends not to reimburse OAGB and to perform it in clinical trials only.

5.4.2 The role of bariatric surgical centres and surgeons

5.4.2.1 Accreditation of surgeons and centres

In France, ca. 500 centres (47% public and 53% private facilities) were performing bariatric surgery in 2016. There is a great variability in size and yearly volume of interventions: 30% of the centres did perform <30 procedures/year and 60% <100 procedures/year. However the 200 establishments that perform annually ≥ 100 operations carry out around 80% of the total bariatric activity.[119, 122, 125]. There are currently no minimal volume criteria to perform bariatric surgery, neither per centre, nor per surgeon. This may likely change in the future due to the result of a recent report concluding on volumes-outcome relationships in bariatric surgery at hospital level.[126] According to this cross-sectional analysis of all patients who underwent bariatric surgical procedures in France from January 2011 to December 2014 (184 332 inpatient-stays), health care institutions performing more than 200 bariatric cases per year were significantly associated with improved postoperative outcomes and less frequent need for reoperation, in particular after gastric bypass.

Currently there is no official accreditation by public authorities for bariatric surgeons or centres. The Société Française et Francophone de Chirurgie de l'Obésité et des Maladies Métaboliques'[ff] (SOFFCO-MM) did instore a non-mandatory labelling ('labellisation') for bariatric centres. Criteria are:

- at least two visceral surgeons, of whom at least one has obtained the interuniversity diploma (DIU) for bariatric surgeon
- appropriate logistic and human resources, including team-staffing and assurance of an on call system
- inclusion in the SOFFCO-registry of each patient undergoing bariatric surgery.

This labelling is declarative (introduction of a specification document or 'cahier de charges'), without any audit system in place to check that specifications are actually met. The SOFFCO label is valid for two years and subject to renewal. Among the 500 French bariatric centres around 200 centres are SOFFCO 'labelled'.

5.4.2.2 Organisation of pre- and post-surgery care

The formalisation of the obesity management in France can be linked to the Obesity plan 2011-2013 which led to the setup of 37 specialized centres of obesity (Centres Spécialisés d'Obésité - CSO). However when the plan expired in June 2013, it had no successor and although some CSOs have proposed or developed formal clinical care trajectories, a strong and solid implementation remains limited and poor resourced. See Textbox 1 for more info on the CSOs.

Box 6 – The CSOs or the specialized obesity centres and their impact until now

- There are 37 CSOs of which 5 also assure the role of CIO (integrated centres of the management of severe obesity). Their mission includes, but goes beyond, bariatric surgery. They have to organise and provide care at a of loco-regional level which implies: coordination of patient care, preoperative support for patients eligible for bariatric surgery, postoperative - and very long-term - follow-up of operated patients, identification and follow-up of clinical research needs. They also have to manage the different actors (hospitals and rehabilitation facilities, health networks, medical houses, health centres, the different HCPs), harmonise practices, develop cooperation, increase the competence of professionals including provision of continuous medical education, inform and guide users (therapeutic patient education), etc.

[ff] SOFFCO-MM is the French professional organisation representing the French bariatric and metabolic surgeons, allowing other French speaking bariatric surgeons for membership as well.

- CSOs can be physically located on one place (in- or outside a hospital, often with some type of affiliation to a hospital), or can be purely 'functional'. CSOs can be public or private.
- Since the cessation of the obesity plan in 2013, many CSOs did not have a stable foreseeable mid-term budget, and a lot of initiatives depended on the goodwill of the different actors and stakeholders. This all explains why, although the initial objectives were promising, their results are heterogeneous and not entirely meeting up expectations.
- There are many more 'obesity centres' that do not carry the CSO flag.

Preoperative evaluation and patient education.

According to the HAS guideline, preoperative evaluation should be done by a multidisciplinary team which includes at least one surgeon, one physician specialised in obesity (physician-nutritionist, endocrinologist or internist), one dietician, one psychiatrist or psychologist and one anaesthetist. [118] The above mentioned CSOs also play a role in the preoperative evaluation and patient education of the severely obese patient.

According to the interviewed HAS expert, respect of a wait-time of at least 6 months ('for patients who have attempted to lose weight without success by non-operative means properly conducted for 6-12 months') seems in practice to be variable and difficult to check, and in some centres the interval between the first consultation and the intervention might actually be very short. It is also difficult to estimate the importance and frequency of the phenomenon of 'medical' shopping.

Postoperative follow-up

The HAS guideline also stipulates that patients who have undergone bariatric surgery must be managed within multidisciplinary teams, in collaboration with the general practitioner (see next section). Short-term initial follow-up in most cases is assured or led by the bariatric centre, CSO or another 'obesity centre'[gg]. The duration of this initial follow-up period is not strictly defined and mostly varies between 1 to 2 years post-surgery. Not only timing but also modalities for the 'hand-over' of the long-term follow-up towards the first line are variable and heterogeneous. Moreover on the long-term one observes that a considerable part of patients drop out.[80, 128]. For more than half of the bariatric surgery patients the follow-up is not sufficient and not systematic.[119]

Currently neither consultations with dieticians, clinical psychologist, and costs related to sport- exercise (coaching) are reimbursed in the context of bariatric surgery, nor are the costs for vitamin-and micronutrient supplements.

5.4.3 Role of GP's

The French Academy of Medicine (grouping the vision of different societies) has undertaken a pragmatic approach regarding the role of GPs for the management of patients during their lifelong follow up. A national survey of three groups, namely surgeons, general practitioners and patients, was performed and showed the need of improved relationship between health care professionals and development of collaborative clinical pathways.[80] According to this survey, patients prefer to be followed immediately after the intervention by a specialist in which they have confidence (61% versus 30% in GP). Three years after the operation this is different because, at that moment, they consider their GP at the best place to follow them. However in practice, the long term management by the GP of the operated patients is neither evaluated nor fully regulated. Moreover, in general GPs mention they

gg In France the SSR centres or Institutes for Follow-up Support and Rehabilitation Care may also intervene in the short-to-midterm revalidation following bariatric surgery. One day-clinic care centres can do, and is regularly used for, multidisciplinary post-bariatric re-evaluations of patients despite the fact they report to be underfinanced for this activity.[127]

have a lack of knowledge, available time and sufficient reward to assure this function.[80]

5.4.4 Bariatric surgery registry and other relevant databases.

Bariatric SOFFCO-registry

The SOFFCO-registry has been setup since the beginning of 2018 by the SOFFCO-MM (Société Française et Francophone de Chirurgie de l'Obésité et des Maladies Métaboliques), following a joint initiative by and in concertation with the HAS. The overall objective was to collect data to assess the quality of surgical practices and post-operative follow-up. The SOFFCO registry is meant to be a national database listing bariatric surgery interventions from a preoperative (obesity assessment, co-morbidity assessment and history, risk-stratification), intraoperative (type of intervention, duration, follow-up) and post-operative point of view. The scope aims to measure the safety of care and the effectiveness by including data on weight, co-morbidity trends and patients' quality of life.

Currently filling in the registry is not legally mandatory, though all bariatric surgical centres performing bariatric surgery are strongly encouraged by SOFFCO-MM to apply for and obtain the 'SOFFCO-labelling', which also engages them to fill in the registry.

For the moment the registry is concise and focuses on the perioperative period (data on preoperative evaluation and risk-stratification, per-operative data, and one month post-surgery follow-up). Other limitations are that at this stage there is no system in place and there are no means foreseen for auditing the SOFFCO-registry.

Other databases

There are other databases in France such as the PMSI and the SNIIRAM database.

- The PMSI database (Programme de médicalisation des systèmes d'information) is a national hospital discharge database that allows to obtain detailed information on the surgical management of obese people (bariatric surgery activity by volume, by technique, type of establishment, territory and roots of DRG). For instance data on mortality after BS or re-interventions after BS can be identified and subsequently crossed with other databases.
- The SNIIRAM database (Système National d'Information InterRégimes de l'Assurance Maladie) owned by the CNAM is a consolidated national health insurance database covering ca. 96% of the French population, containing individual but anonymized demographic data and data on ambulatory care, in-patient care, payment for sick leave, etc..... For a subset of ca. 9 million patients, it also contains medical diagnoses (ICD-10 code) for severe and costly chronic diseases for which some patients may be exempted from any payment. In the context of bariatric surgery, the CNAM has set up a cohort follow-up on 18 477 patients who underwent a first bariatric surgical operation in 2009, as well as another cohort on patients operated on in 2015. This follow-up cohort gathers information on the care consumption of the operated persons, complications and deaths following bariatric surgery, but it neither does record data on quality of life nor does it record data on non-reimbursed care (dieticians, psychologists, certain nutritional supplements).

On September 23rd 2019 the HAS announced that - as part of its work and mission to improve the quality and safety of care - it will develop and collect indicators specific to bariatric surgery and will produce documents on the obesity and overweight pathway in general, of which bariatric surgical interventions, preoperative assessment, postoperative follow-up are part of its scope. This project is just about to start. In order to have better long-term data, the aim is to link the data from the PMSI and the SNIIRAM data with the SOFFCO registry, as well as to collect and evaluate Indicators for Improving the Quality and Safety of Care data (IPAQSS= Indicateurs Pour l'Amélioration de la Qualité et de la Sécurité des Soins).

5.4.5 Body contouring surgery

Some reparative surgery procedures can be reimbursed after a bariatric surgery. For abdominal dermo-lipectomy procedures, the following indication must be mentioned "reconstructive surgery in major degradations of the anterior abdominal apron partially covering the pubis, justified by a preoperative photograph, for instance after weight loss for morbid obesity, or in the aftermath of bariatric surgery". For dermo-lipectomy procedures of limbs act, the following indication must be respected: "reconstructive surgery

among others after weight loss for morbid obesity, or in the aftermath of bariatric surgery". Both type of procedure need a favorable a priori opinion by the Health Insurance in response to a specific individual request[hh].

Reconstructive breast surgery is not reimbursed after bariatric surgery.

5.5 Sweden

5.5.1 Criteria for reimbursement and bariatric surgery utilization rates

Criteria for reimbursement

Baratric surgery is paid by public funding if patients are within the reimbursement criteria. As health care is strongly decentralized, and there is no nationwide guideline these criteria vary from county[ii] to county. Most counties apply a BMI > 40 kg/m2 , or a BMI > 35 kg/m^2 with co-morbidities.[129] In general in most county councils the requirements to be considered are[jj]:[130]

- BMI> 35 for more than five years or BMI > 35 with co-morbidities;
- Age> 18 years;
- Earlier serious dieting attempts;
- Stable psychosocial situation;
- Understanding the consequences and limitations of the procedure;
- Motivation to undergo the procedure and participate in the follow-up program;
- Acceptable operational risk / no absolute contraindications

However the list of co-morbidities varies between counties (e.g. diabetes mellitus type 2, hypertension, gastro-oesophagal reflux disease, hip/knee osteoarthritis, obstructive sleep apnoea, cardiovascular disease, obesity-related cardiomyopathy, pseudotumor cerebri, venous leg ulcer, pulmonary embolism) and some counties will apply indivual assessments (e.g. in case of lower BMIs).

In general, patients aged between 18 (or 20 in some counties) up to 60 (or 63 in some counties) years of age were eligible for surgery. In some counties an individual assessment was required above the age of 60 years.[129] Yet, an upper age limit does no longer exists (following a court-case which won by a patient). There is consensus that bariatric surgery in minor adolescents should only be done via enrollment in the scientific study (TEEN-BEST trial[kk] [82, 131]). Minor adolescents undergoing bariatric surgery are operated in only a couple of centres, and further follow-up after surgery can be done in other hospitals adapted for this population.

When patients fall within the criteria as determined by the county council, bariatric surgery is paid by public money. In general private payment for medical interventions (that are not reimbursed) is unusual in Sweden. Yet, bariatric surgery is an exception on this rule. When patients do not fall within the eligibility criteria for reimbursement of a county, or when patients find waiting time for surgery too long, they pay the surgery themselves. This

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hh This information was obtained through personnel communication with a physician-consultant of the Health Insurance National Body (CNAMTS).

ii Sweden is divided into 290 municipalities and 21 counties (or 'regions', 12 county councils and 9 regional bodies). Healthcare in Sweden is largely tax-funded, a system that aims to ensure that everyone has equal access to healthcare services. Both county councils and municipalities have considerable autonomy. The 21 county councils are responsible for healthcare services to all residents. The municipalities are responsible for care of the elderly in their home or in special accommodation, and their remit also includes care for people with physical disabilities and psychological disorders.

jj https://www.internetmedicin.se/page.aspx?id=452

kk This is a multicenter international randomized controlled non-inferiority trial. 264 adolescents aged 13-17 years, will be randomized for RYGB or SG. A historical cohort of patients in a conservative lifestyle intervention will be used to compare with both surgical procedures. Multicenter-multi-country trial (the Netherlands and Sweden). Study start 2018-11, estimated study completion 2027-10)

concerns a considerable amount of patients (~20-25% according to the registry and consulted experts).[132, 133]

Utilization of bariatric surgery

The number of yearly bariatrics interventions increased from ca. 600 before 2006 to 5 466 (i.e. 5 243 primary procedures and 223 revisions) interventions in 2018. There was a peak with ca. 8000 interventions in 2011, and during the most recent years there has been a slight decrease in the number of interventions.[134] The figure in 2018 corresponds with 63 bariatric operations/100 000 inhabitants.[133]

Yet, given the different reimbursement criteria, also the utilization rates vary across regions. The variation in geographical access to bariatric surgery is considered unacceptably high.[133]

- The average age of patients undergoing bariatric surgery is 40.9 years and most patienst (78%) are female. The average BMI is 40.9. Among the operated patients 55% have any comorbidity. The most frequently reported comorbidities are hypertension (23.6%), depression (17.1%), muskuloskeletal pain (16.7%) and diabetes (11.9%).133
- For the last two decades, gastric bypass has been the dominating procedure in Sweden. During the last 4-5 years, there has been an increase in sleeve gastrectomy in Sweden. While gastric bypass still is the most common procedure (51.1%), the difference with SG becomes small (45.6%). . 133

5.5.2 The role of bariatric surgery centres

There is no specific accreditation of bariatric centres, and there are no minimal volume requirements per centre. Non-official volume criteria, if any, are up to each county. Most counties (the small and mid-size counties) designate one hospital for their region, unless in more densely populated regions. In bigger regions several hospitals could serve. Most often relatively smaller hospitals are chosen because bigger hospitals by priority focus more on other upper-gastrointestinal (GI) and lower-GI surgical interventions where cancer surgery predominates.

No volume requirements but in practice only a limited number of hospitals perform bariatric surgery

In 2014, there were 43 centres performing bariatric surgery with a yearly volume ranging between 6 and 503.[135] Yet, in 2018, the number of hospitals performing bariatric surgery decreased to 39: 30 public and 9 private hospitals[II]. In the private hospitals 48.5% of the 2 089 procedures were publicly financed. Although there are no official minimum volume requirements, in practice most centres operate at least 50 patients per year, and according to the consulted experts many centres will nowadays perform ca. 200 interventions per year. Most centres dispose of ≥ 2-3 bariatric surgeons.

Waiting times

In 2018, the time between receiving the referral letter for surgery and performing the surgery was on average 331 days (median of 241 days).[133] The preoperative process may look very different according to the hospital site. In some centres patients must attend 'weight school' before a definitive decision about surgery is made while this is not the case in other centres. Despite this variation waiting times seem to drop over time.

Lump sum payment with small contribution of patients

Bariatric surgery centres receive a lump-sum from their counties which may differ per county. It's up to the bariatric centre to decide how to use and deploy these means.

Both follow-up consultations (medical, dietician, psychologist), and cost for medicines (and some over-the-counter products) are covered by the counties. The patient will pay a minor contribution per consultation with a yearly maximum.

[II] On a total of 100 hospitals (of which 85 are public hospitals)

Multivitamin supplements are not covered. Among patients that attend follow-up consultations about 85% take vitamin supplements. For most patients (about 90%) multivitamin and vitamin B12 is prescribed. The prescription of other supplements (folid acid, vit D, Ca and Fe) is more variable. (SOREG 2014)

Follow-up focuses on the first year

Initial follow-up is done by the bariatric centre for at least 1 year. Within these specialist-level centres, often bariatric nurses/dieticians are responsible for routine follow-up, and seek help of the surgeon or bariatric specialist when needed. Typical initial follow-up intervals are 6 weeks, 6 months, 1 year and sometimes 2 years post-operatively. Public hospitals have the possibility to outsource this follow-up care to private units.

Nearly all the hospital sites have an acceptable to very good follow-up in the early postoperative phase (after 6 weeks: 94% of the patients attend follow-up consultations with a variation between 39% to 100%). The target for six weeks consultations was set at 100%.

After 1 year the follow-up rates are, in general, still acceptable (85% for a target of 90%) although in some centres a review of their procedures is required to increase the attendance rates.[135] While the need for specialized follow-up after two years is acknowledged (e.g. start of weight regain), many centres do not receive funding to cover such long follow-up trajectory. As a result, the follow-up rates after two years are 63% (but with a large spread, from 0% to 85%).[135]

The five-year follow-up is considered as a challenge.[135] Since funding is lacking for follow-up after two years in many countries no normative targets were defined. Nevertheless, still a nationwide follow-up rate of 51% is obtained after five years (ranging from 0 to 83%)[mm]. Reasons of not showing up are sometimes entirely patient-related (e.g. patients feel well and do not see the need; patients ashamed about weight regain). In other cases travel distances play a role. The cause can also related in failure to make the patients understand that follow-up care is required. Specific groups that require attention are patients operated in other counties or in centres that stopped performing bariatric surgery. These patients are especially vulnerable to missing out on adequate follow-up care.

5.5.3 The role of the GPs

After the initial (one to) two years of follow-up at the bariatric centre, the responsibility of subsequent follow-up is (supposed to be) transferred to the general practitioner (GP), however there is a lot of variation. GPs/first line centres dispose of a fixed budget/payment. In a limited number of these primary care centres, follow-up is assured by clinical nurse specialists, under the responsibility of the GP. Lab tests are paid by the GP-primary centre, and this explains why (some) primary care centres might be inclined to omit or limit the use of the most expensive tests.

5.5.4 Nationwide registry

Content of the registry and data entry

In 2004 the Scandinavian Obesity Surgery Registry (SOReg) project was initiated to obtain data for quality of care monitoring and research. The registration receives government funding covering data coders, computer infrastructure and surgeon's time. Hospitals do not have to contribute financially to be part of the registry.

Data entry (aimed at maximum of 3 minutes per data entry) is done via an online platform. The registry has built-in logical functions that minimizes erroneous or aberrant data entry, and has a warning function for unusual data.

The standard variables include:

- Demographics:
  - Mandatory: Height – Weight (baseline/ postop at 6 weeks, 1, 2, 5 years) – Age – Sex;

[mm] The follow-up by private doctors or primary care are not registered in SoREG.

- Optional: Abdominal circumference;

- Hospital (automatically)
- County of residency (automatically)
- Comorbidities:
  - Mandatory (baseline/ postop at 6 weeks, 1, 2, 5 years): Type 2 diabetes; hypertension; sleep apnoea; dyslipidemia; depression; diarrhoea; dyspepsia; muskulo-skeletal pain.
- Complications:
  - Mandatory (postop at 6 weeks, 1, 2, 5 years): scoring the presence and severity based on a list of 16 complications (e.g. leakage, bleeding, deep vein thrombosis)
- Readmission:
  - Mandatory (postop at 6 weeks, 1, 2, 5 years)
- Surgery:
  - Mandatory (postop at 6 weeks, 1, 2, 5 years)
- Labarotory tests:
  - Optional (postop at 1, 2, 5 years): HbA1c; fP-glucose; HDL; LDL; TG; Haemoglobin; Creatinine; Vitamin D; Parathyroïd hormone; Blood pressure.
- Substitution
  - Optional (postop at 1, 2, 5 years): substitutions with different minerals and vitamins.
- Quality of life:
  - Optional (postop at 6 weeks, 1, 2, 5 years): SF-36 and 'Obesity Problems Scale'.

The registry provides operational definitions to register comorbidities, complication severity etc.[nn].[134] While it is a pre-requisite for all Swedish registries to include quality of life measures if they want financial support of public authorities.[134], the recording of the quality of life measures is optional.

The data entry at baseline is generally done by surgeons (or delegated to administrative staff). During the follow-up, data for patients at risk is, in general, entered by surgeons while patients at low risk and without problems are, in general, coordinated by a nurse who is also responsible for data entry.

Nationwide registry expanded to Norway

After a pilot phase SOReg was launched in Sweden in 2007, and since 2011 all bariatric surgery centers in Sweden contribute to the SOReg registry. The ambition from the start was however to include all Scandinavian countries. However, due to legal issues mainly pertaining to transfer of patient data across boarders this was found to be difficult. Therefore, Denmark established a national registry (not included in SOReg), and after years of legal struggle Norway was able to establish a SOReg based register in 2014 and progressively, by the end of 2016 most hospitals in Norway are now also reporting to Norwegian SOReg.[132, 134]

Although it is not a legally mandatory registry all hospitals performing bariatric surgery contribute to it and it covers >98% of all bariatric surgical procedures in Sweden, including procedures performed in self-paying patients.[133]

Governance structure

A steering committee is responsible to oversee the long-term goals of the registry. It includes representatives from hospitals, universities, counties, etc. The day-to-day management is the responsibility of a director.

[nn] Short-form 36 generic Quality of Life questionnaire.

Audit and control

Once every second year an audit is performed based on an at random selection of patients per hospital (25-75 depending on hospital volume). A data quality assurance nurse checks the data verification source. The audit of the Swedish SOReg shows that >98% of data are correct. The data are also cross-matched to other administrative databases (e.g. hospital data, drug utilization, cause of death, social security).

Quality indicators and research

SOReg offers a reliable dashboard mainly on patient characteristics, quality assurance and outcomes (e.g. complication rates, QoI; comorbidities, weight loss). All results are published annually on the internet with public disclosure of the results per hospital[oo]. Since the start of the registry, numerous scientific studies were published based on registry data.

5.5.5 Body contouring surgery

Also in Sweden a study showed that most post-bariatric patients, but women in particular, experience significant problems of excess skin and request body contouring surgery.[136] A large discrepancy exists between the amount of body contouring surgery requested and that performed. Like in many other countries, different factors may contribute to this discrepancy, though one reasonable explanation given by the authors, is that in Sweden body contouring surgery is not prioritized in the public healthcare system.

Usually it is only abdominal plastic surgery that is offered in case of excess skin, which, is not considered a complete remedy for this patient group. There is a consultative document prepared in 2008 and titled in particular the "National Medical Indications - Abdominal Plastics and Similar Operations - Report of the Expert Group for Plastic Surgery".[137]

In order to be considered for county council-funded abdominal plastic surgery, the following minimum criteria need to be met[pp]:[130]

- Constant skin increase (approx. 3 cm) which causes low quality of life, which manifests in one or more of the following: problems with abdominal hygiene, ulcers / eczema in skin folds, problems with voiding, psychosocial problems, sexual problems, great difficulties in finding suitable clothes, lumbar pain, impacted ability, abdominal muscle problems, appearance disability, sick leave.
- Understanding that one should have achieved his or her target weight and had been weight stable preferably 1 year before plastic surgery, i.e. about 2.5 years after bariatric surgery.
- BMI should be <25 and have been stable for at least six months; however after earlier massive obesity, a higher BMI can be accepted, since abdominal plastic surgery and similar procedures form part of the obesity treatment.

However, many county councils have more stringent criteria for offering abdominal plastic than recommended by these national guidelines This is one of the likely reasons why there is a large discrepancy between the amount of body contouring surgery desired, requested and that performed.[130]

Therefore candidates for bariatric surgery should be informed regarding restrictions on public support for this, and be prepared for own financial responsibility.[130] It is, after all, uncommon for Swedish people to have a private health insurance and most patients cannot afford paying for out-of-pocket body contouring surgery at private clinics.[136]

[oo] Annual SOReg reports can be found at http://www.ucr.uu.se/soreg/index.php/arsrapporter.

[pp] https://www.internetmedicin.se/page.aspx?id=4989

5.6 Compliance follow-up care

High attrition rates to follow-up appointments especially from the second year post-surgery onwards

Attrition rates to follow-up programmes post-bariatric surgery have been reported to range from 3-89% depending on the type of surgery and the nature, frequency and duration of the prescribed follow-up care.[66, 138-140] In general, during the first year attrition to follow-up rates are still relatively low but then start to increase. Jurgensen (2019)[140] showed attrition rates of 29% during the first year; 46% during the second year and 69% in the third year. A similar pattern was observed by Larjani et al. (2016).[141] It should be noted that, throughout the literature, the measurement of appointment attendance adherence and compliance in general lacks standardization.[142]

Patient factors related to attrition: young age and poor socio-economic context

Retrospective studies have shown that several patient-related factors are associated to non-adherence (e.g. distance to bariatric surgery centre; younger age (Below mid-fourties)[143, 144], unemployment, poor social support and avoidant relationship style and other psychological factors such as anxiety disorder and depression, male[144]).[141, 142] Patients with a positive relationship with the operative surgeon and lack of complication rates have higher compliance to follow-up appointments.[145] Aarts et al. (2017)[146] on the other hand showed that patients who are healthy, busy and have had a successful post-bariatric surgery experience may see returning to the bariatric centre as 'a waste of time'. This was also confirmed during the Belgian patient interviews (see Chapter 3). The centre's usefulness diminished when patients felt that they developed adequate coping strategies. Although many factors for attrition have been discussed in the literature, the actual reasons for poor attendance from the patient's perspective are largely unknown.[146, 147]

Consensus about value of follow-up appointments but no hard evidence

As described in chapter 4 there is little evidence about the optimal frequency and components of a follow-up programme for bariatric surgery. Nevertheless, there seems to be consensus that elements such as nutritional counselling, exercise programmes, psychological support, management of surgical complications, monitoring of obesity-related comorbidities are important.[147]

It is currently unknown if patient attrition from bariatric surgery programmes has an impact on clinical outcomes. Yet, adherence to follow-up care seems to be associated with positive lifestyle behaviours (e.g. regular intake of vitamin supplements, fewer intake of sweetened beverages).[148] A recent study by Jurgensen et al. (2019)[140] illustrated that weight loss is significantly higher (although clinically only a minor impact was observed) for patients that attended the bariatric surgery follow-up care. In year three of follow-up this finding was no longer significant (possibly due to very small sample size).[140]

Also Elrefai et al. (2017) [149] found that, at the moment of drop-out, patients who drop-out had similar weight-loss as patients who attended follow-up care. Yet, after being dropped out weight loss is less than those who stayed in the programme.[149] Also Spaniolas et al. (2016)[150] found larger weight loss among patients that were attending follow-up appointments during the first year compared with those that didn't.[150] A recent study showed that complete follow-up in the 1st year after RYGB was independently associated with a higher rate of improvement or remission of comorbid conditions.[151]

A meta-analysis by Kim et al. (2014)[152] included four studies (prospective cohort studies). When the data were pooled it was found that the percentage of weight loss at 1-year post gastric bypass surgery increased when patients were compliant with follow-up compared to patients that weren't compliant with follow-up. Furthermore, studies that followed gastric bypass patients for longer than 12 months concluded consistently that compliant patients had statistically greater weight loss. Yet, it should be noted that this meta-analysis is based on 4 studies (no RCT's) including only 365 patients.

In addition an observational study by Spaniolanis et al. (2016)[66, 150] found that greater attendance during the first year follow-up care was associated with greater weight loss. Also attending nutritional visits[66, 153] and psychiatric follow-up[66, 154] is associated with greater weight loss. It is also possible that the relationship between attendance and weight loss is bidirectional (e.g. patient with lack of weight loss are reluctant to attend follow-up appointments because they feel ashamed). [66]

Hood (2016)[66] concluded that there is evidence for an association between follow-up attendance and weight loss and that the follow-up attendance is poor. A review by Moroshko et al. (2012)[138] including 8 studies (all published before 2011) concluded that evidence about the predictors for follow-up compliance is weak. Nevertheless a greater baseline weight and a longer distance to the follow-up clinic seem to be recurrent identified factors contributing to non-compliance.

Weight regain: interplay of several factors of which one is attrition to follow-up

A systematic review by Karmali et al (2013)[155] showed that the reasons for weight regain (**long-term**) after bariatric surgery are multifactorial. One of the identified patient factors that contribute to weight regain is non-compliance with nutritional and lifestyle recommendations. The non-adherence of post-surgery follow-up appointments within this group is high. Other patient-related factors include psychiatric co-morbidities linked to eating disorders (e.g. grazing, binge eating) and endocrionopathies. The authors conclude that addressing weight regain requires a systematic approach including patient assessment, focussing on contributory dietary, psychological, medical and surgical factors. A multidisciplinary health care team must provide a comprehensive weight management programme including patient education and promotion of adherence of the post-surgery diet, patient monitoring (journaling) and reinforcement (review of food records).

Professionals support structured programmes while patients appreciate a tailored approach

While the medical community recognizes the need for patients to return for structured follow-up bariatric surgery monitoring, counselling and data collection, they also state that variation of the pathway (e.g. psychological support: frequency and intensity of support) is required.

A study by Aarts et al. (2017)[146] showed that patients wish to be able to contact the bariatric surgery centre more on an ad-hoc basis, receive continued care from one provider and receive more counselling in regard to their new physical form.[146] Optimal care was defined by patients as personalized care that is easily accessible via e-mail, phone, or through their general practitioner, indefinitely available to them.[146] This is in line with what was observed via the patient interviews (see chapter 3). Although patients are not against a structured follow-up approach they stressed that there is a need for (small) ad-hoc questions and in case of problems (e.g. alcohol abuse, medical complications, depression, eating disorder) a more intensified follow-up than the standard approach.

Multi-disciplinary (specialized) follow-up with enough time per patient contact

Rushed programmes (because bariatric centres aim to perform as much as surgery as possible while capacity to provide follow-up care is limited) create feelings of ‘being a number’. This has a risk that patients cannot communicate their personal barriers and fail to generate solutions, control and self-reliance.[146] In addition, the interviews illustrated that a multidisciplinary approach is required to ensure that all aspects of care (e.g. nutritional advice, psychological care, sexuality) are covered (see Chapter 3).

Aarts (2017) also showed that patients prefer to be followed-up by their GP.[146] Nevertheless, they felt that their GP often lacked the expertise needed to manage their care. Patients attributed a crucial role to bariatric surgery dieticians in follow-up care. Also the interviews showed that patients appreciate specialised follow-up and that the role of GP’s is rather limited (Chapter 3).

Enforcing follow-up adherence is much harder compared to pre-surgery appointment adherence

While pre-surgery adherence can be enforced (surgery is the leverage for adherence) this is much harder for post-surgery appointments. Hood (2018)[142] provides some strategies to improve adherence:

- Patient engagement by behavioural contracts, frequent reminders from BS-centre staff;
- Innovative strategies to remove barriers (e.g. remote interventions, variety of appointment times);
- Patient education about variety of potential problems and side-effects that might occur;
- Facilitate contact with behavioural experts and use motivational interviewing;
- Screen for cognitive impairment and refer appropriately (e.g. neuropsychological) if identified;
- Evaluate the impact and timing of proven lifestyle modification interventions (e.g. self-monitoring);
- Focus on areas with evidence for critical impact (vitamin deficiency, physical activity);
- Use emerging technologies to improve self-management (e.g. remote patient monitoring).[142]

An evaluation (not random controlled study) of a pre-hospital patient education program (structured GP review, patient information evening, online learning package, nurse coordinator) showed that attendance rates to follow-up care during the first twelve months increased.[156] Also the use of intensive care planning might help to increase attendance rates.[157]

5.7 Volume-outcome relationship

The literature regarding volume-outcome relationships (hospital volumes and surgeon volumes) was analysed via a review of the peer-reviewed literature (see appendix to chapter 5 for search strategy and detailed tables of the included studies). In 2012 two reviews were published regarding volume-outcome relationships in bariatric surgery.[158, 159] Both reviews were taken as a starting point and updated with more recent literature. In addition, we searched for more recent studies.

Evidence about volume-outcome relationship based on reviews published in 2012

Both reviews concluded that there is a volume-outcome relationship for bariatric surgery. Zevin et al. (2012)[159] reviewed 13 studies about the relationships between surgeon volume and outcomes and 17 studies on hospital volume and outcomes (e.g. patient mortality and complications) narratively. They concluded that there is strong evidence for improved patient outcomes in the hands of high-volume surgeons. Higher annual hospital case volumes are also associated with improved patient outcomes; however, the evidence is weaker. The authors concluded that the available evidence supports the concentration of care for bariatric surgery in high-volume centres. This can be explained by the fact that surgeons and staff caring for bariatric patients are more experienced. Yet, the authors state that they cannot recommend an optimal threshold because the analysed studies use different cut-off points. Moreover, they point to potential disadvantages that should be monitored such as access to care (by increased travel distances) and monopolization of care.

The second review of Markar at al. (2012)[158] included 13 studies on hospital volume and 6 studies on surgeon volume. The authors pooled[qq] the data of the available studies by the following criteria:

- Hospitals with >100 cases per year were defined as ‘high-volume’ hospitals;

[qq] Two primary studies were excluded in the pooled analyses for the hospital volume and one for the surgeon volume.

- Surgeons with a maximum of 25 cases per year were labeled as low-volume and surgeons with at least 50 cases were labeled as high-volume surgeons;

The authors found that mortality was reduced following surgery at high volume institutions (0.24 vs. 2.18 %; pooled odds ratio=0.26; P=.004) and by high volume surgeons (0.41 vs. 2.77 %; pooled odds ratio=0.21; P<0.001). Similarly, morbidity was reduced in high volume institutions (7.84 vs. 8.85 %; pooled odds ratio=0.52; P<0.001) and with high volume surgeons (6.92 vs. 7.29 %; pooled odds ratio=0.47; P<0.001).

As such the concentration of care in high-volume institoins was supported. Yet, both review included studies that date back to a period that mortality and complication rates for bariatric surgery were higher than today.

More recent research seems to confirm the volume outcome relationship

Our review identified 11 additional studies on volume-outcome relationships in bariatric surgery. Ten of these studies evaluated the association between hospital volume and outcomes of which 7 found a positive association, 2 a null finding and 1 a negative association. Five studies evaluated the association between surgeon volume and outcomes. All five found a positive association. Yet, in one study this association was only significant for SG and not for RYGB.

Although the avalable evidence is not entirely consistent, even after a general improvement of mortality and complications rates (also for low volume institutions and surgeons) there still seems to exist a relationship between both surgeon and hospital volume with improved outcomes. Nevertheless, it is not possible to infer optimal volume threshold based on the available literature.

Table 26 – Summary table of volume-outcome relationship literature

Study	Hospital volume	Surgeon volume	Auhor conclusions
Brunaud et al. 2018[126]	+	NA	Health care institutions performing more than 200 bariatric cases per year were significantly associated with improved postoperative outcomes and less frequent need for reoperation.
Doumouras et al. (2017)[160]	0	+	Surgeon volume and teaching hospitals were the most important factors in decreased all-cause morbidity after surgery.
Doumouras et al. (2017)b[161]	-	+	This study underscored the importance of surgeon volume in outcomes even in high resource settings for fellowship trained surgeons. It also demonstrated that there was improvement in outcomes over time for high-volume fellowship-trained surgeons in the center of excellence system suggesting a cumulative volume effect.
Celio et al. (2016)[162]	NA	SG:+ RYGB:0	30-day complication, readmission, and reoperation rates are decreased when patients undergo SG by high volume-SG surgeons. Although concurrent RYGB volume independently improves complication rates, it has no significant impact on readmission or reoperations.
Pradarelli et al. (2016)[163]	0	NA	Hospital complications were unrelated to volume standards required for accreditation as a comprehensive bariatric surgery center
Varban et al. (2015)[164]	+	NA	Significant improvements in the safety profile of bariatric surgery have occurred in the past decade; both high- and low-volume hospitals have experienced a decrease in adverse events over time. However, the inverse relationship between hospital volume and surgical quality still exists; the highest volume hospitals experience fewer serious complications than lowest volume hospitals. However, the effect of hospital volume on mortality is diminished and may no longer serve as an accurate measure of quality
Stenberg et al. (2014)[165]	+	NA	Annual hospital volumes were inversely correlated to the risk for serious complications

Torrente et al. (2013)[166]	+	+	Although a high-surgeon volume correlated with lowered mortality, we also found that high-volume hospitals demonstrated improved outcomes, highlighting the importance of factors other than surgical expertise in determining the outcomes.
Gould et al. (2011)[167]	+	NA	Bariatric surgery mortality and complication rates are very low. A volume-outcomes relationship exists when hospital-level data are analyzed, but there is no inflection point to justify selecting a specific volume threshold to determine Centers of Excellence. Low-volume centers with extremely low complication rates can be identified and, conversely, there are high-volume centers with elevated rates of complication.
Asano at al. (2012)[168]	+	NA	Currently, the majority of public hospitals in Brazil has low volume of bariatric surgery and does not meet the requirements to be accredited as a Center of Excellence (CoE). According to the study findings, increasing the number of bariatric CoE with enough resources to become high-volume hospitals might help solve part of the problem.
Chiu-Chiu (2012)[169]	+	+	This study suggests that LOS may explain the lower costs incurred at high-volume hospitals and by high-volume surgeons in comparison with low-volume hospitals and surgeons.

LOS= length of stay; RYGB=Roux-en-Y Gastric Bypass; SG= Sleeve gastrectomy; ICU= intensive care units. +=positive significant association; 0=no significant association; NA=not applicable. (See for more details Appendix to Chapter 5).

5.8 Key points

The Netherlands

- **The indications for surgery in the Netherlands are in line with international criteria for reimbursement of bariatric surgery (BMI ≥40 kg/m² or BMI ≥35-kg/m² with co-morbidities). Patients aged above 65 years can exceptionally undergo bariatric surgery on a case-by-case evaluation. The reimbursement of bariatric surgery for diabetic patients with a BMI<35 and adolescents is under consideration. Adolescents <18 years are only operated in the context of a clinical trial.**
- **Since 2011 bariatric surgery is, on the request of the professional organisation of surgeons, concentrated in a limited number of centres (anno 2019: n=18). The principal criterion is a minimal yearly caseload (recently increased from 100 to 200). In addition, critera are specified regarding equipement, medical staff (e.g. at least two surgeons), etc. The health insurers also use quality criteria in the process of selective contracting.**
- **The pre- and post-surgery pathway varies between centres. Eight centres subcontract the pre- and post- surgery care to a private for profit organisation. As a consequence, the care in these 8 centers is more standardized. A large part of the pre- and post surgery care (e.g. especially information and patient education) is organised via group sessions.**
- **The multi-disciplinary care (both pre- and post-surgery) is covered by the contracts between the care providers and the health insurers. Although there is an incentive to be efficient, the transparency and public reporting of quality indicartors ensure that care is provided according to high quality standards.**
- **General practitioners have an important role in the pre-surgery phase since they are the principal referring source to the bariatric surgery centre. Given that during the first years post-surgery the largest share of care is provided by bariatric surgery centres the role of GP's is limited (e.g. motivating patients to adhere follow-up appointments). Their role gradually increases (e.g. lab testing) and is in general handed over after 5 years.**

- A compulsory centrally funded registry exists including data from all bariatric surgery patients since 2015 (with a 5 years follow-up). The quality of the coding is audited every two years. Bariatric centres receive feedback and benchmarks. In addition, the quality indicators are also used by health insurers in the process of selective contracting.
- There are restrictions for reimbursement of post bariatric body contouring surgical (BCS) procedures with as a consequence a growing population of patients who have undergone bariatric surgery, but have no access to post-bariatric BCS.

England

- NICE guidelines recommend bariatric surgery for patients with obesity (BMI >40 kg/m² or BMI 35-40 kg/m² with co-morbidities) for which intensive, specialised weight management services failed to achieve or maintain weight loss. In addition patients with recent onset of diabetes and a BMI of 30-35 kg/m² can be referred for assessment of surgery. For patients with a BMI>50 kg/m² bariatric surgery is recommended as first line treatment.
- These NICE-recommendations were also adopted in the nationwide guidance for commissioning. Yet, large variation exists in commissioning (which is now the responsibility of clinical commmissioning groups (CCG)). It seems that, despite the demonstrated cost-effectiveness of bariatric surgery, CCG's limit access to bariatric surgery due to limited resources in attempt to save the upfront costs.
- Obesity care in England is organised in 4 tiers. GP's have to refer patients with severe obesity to specialised weight management clinics (Tier 3). Only when lifestyle (nutritional advice and exercise therapy – except for the people with severe and complex obesity) failed they can be referred for bariatric surgery (Tier 4).
- Tier 4 providers have, according to commissioning standards, to comply with several criteria including the availability of a multidisciplinary team, yearly minimum volumes (100 per centre and 50 per surgeon), submitting data to the national bariatric registry. It is, however, unclear how strict these requirements are applied, monitored and sanctionned (in case of non-adherence).
- Bariatric surgery centres are responsible for the follow-up during the first two years and the role of GPS is limited. Thereafter a shared care model is applied with an important role of GPs. Guidance exist to when (symptoms, complaints) and how (urgent versus routine) they should refer patients towards bariartric surgery centres.
- Despite the high prevalence of obesity in England with around 6 000 bariatric (within the NHS - data about bariatric surgery in private clinics not available) surgery interventions in England per year, the uptake of the NICE-guidelines is very low. When England would have a similar penetration rate for bariatric surgery as other countries it is estimated that 50 000 interventions per year are performed.
- A national, compulsory but unfunded registry for bariatric surgery exists. This was initiated by three professional organisations of surgeons and is organised by a private company. Both NHS-providers and private providers (about 75% of all submitted patient data come from the NHS) submit data to the registry. Concerns about data adequacy and administrative burden are made and linked to the unfunded character. It also hampers the publication pace of reports. Nevertheless, data from the registry are used in a public reporting tool (on the level of the hospital and the surgeon).
- There are criteria but also variation in the access to body contouring surgery after bariatric surgery

France

- The eligibility criteria for the reimbursement of primary bariatric surgery in France are in line with other Western-European countries (BMI ≥40 kg/m2 , or a BMI ≥ 35 kg/m2 in combination with co-morbidities). For candidates aged between 18 and 60 years, agreement is given quasi-automatically and it is suspected that some of the indications are excessive or incorrectly stated.
- Over the last 10 years the number of bariatric procedures performed in France tripled and reached ca. 50 000 per year since 2016.
- In 2016, ca 500 centres (47% public and 53% private facilities) were performing BS. There is no accreditation of bariatric centres by the French government but a non-official and non-mandatory autoregulation initiative created 200 SOFFCO labelled centres among the 500.
- There are currently no minimal volume criteria to perform BS neither per centre nor per surgeon but the 200 establishments where ≥ 100 operations are performed by year carry out ca. 80% of the total bariatric activity. A recently published cross-sectional study showed a volumes-outcome relationship in bariatric surgery at hospital level (with a threshold used of 200 BS/year).
- 37 specialized centres of obesity (CSOs) were set-up in 2013 to provide a global response to severe obesity but they have been implemented in a variable and heterogeneous manner. Currently they don't have a legal status or entity, they do not dispose of a dedicated mid-term guaranteed budget (many initiatives and their quality depend on local initiative, goodwill and self-governance) and there are many more 'obesity centres that 'do not carry a CSO flag'.
- Preoperative evaluation is done by a multidisciplinary team which includes at least one surgeon (visceral surgeon), one physician specialised in obesity (physician-nutritionist, endocrinologist or internist), one dietician, one psychiatrist or psychologist and one anaesthetist.
- Post-surgery care and follow-up (including the timing and modalities for the 'hand-over' towards first line) are heterogeneous. Moreover, on the long-term a very considerable part of patients seems to be 'lost to follow-up'. GPs should play a central role in the (coordination of) care in the long-term follow-up but they do not feel sufficiently knowledgeable on post-bariatric surgery issues and care, have limited time for these patients and they feel not sufficiently rewarded for the necessary time invested or needed when providing care and management with regard to obesity- and post-bariatric care.
- The weakness of the currently available (in 2017) quantitative and qualitative data on bariatric surgery may have contributed to the observations made. The SOFFCO-REGISTRY which is a specific national bariatric surgery registry, has been implemented since 2018. The overall objective of the registry is to collect data to assess the quality of surgical practices and post-operative follow-up. But at this stage it is only focusing on the pre-operative evaluation, the operative risk-profiling, the operation, and the short-term post-operative outcome. Other current limitations are that the registry is not mandatory (as only the 'SOFFCO-labelled' centres are urged to fulfil their obligation to enter their patients in the registry), and that there is no resources or a system for auditing the SOFFCO-registry.
- Body contouring surgery after bariatric surgery is possible in some circumstances, and after a priori approval of a specific request. Only abdominal dermo-lipectomy, and dermo-lipectomy of the limbs can be taken into considerations. Other parts of the body affected by the substantial weight loss after BS are not covered by social health insurance.

Sweden

- The indications for bariatric surgery in Sweden are generally in line with international criteria for reimbursement of bariatric surgery (BMI > 40 kg/m2 , or a BMI > 35 kg/m2 for more than 5 years or with co-morbidities). However the organization and funding of healthcare is strongly decentralized, leading to different criteria between counties and also in variation in accessibility to bariatric surgery. In general, patients aged between 18 (or 20 in some counties) up to 60 (or 63 in some counties) years of age were eligible for surgery. Yet, an upper age limit does no longer exist (following a court-case which won by a patient). About 20-25% op patients pay bariatric surgery themselves when they do not meet the reimbursement criteria or when they want to bypass long waiting times.
- Sweden has a high utilization rate with 63 operations per 100 000 inhabitants but utilization rates between counties vary. Gastric bypass (RYGB) is the most common operation in 2018 as Sweden started relatively late to adopt the sleeve gastrectomy (SG). Nowadays SG is almost at par with the RYGB.
- There are 39 bariatric units performing obesity surgery spread across the 21 counties/regions. Although there are no volume thresholds, a trend of concentration of care in a smaller number of hospitals takes place over time. In general each county/region has one hospital offering bariatric surgery, and the bigger or more densly populated regions often have two bariatric centres. in practice most centres operate at least 50 patients per year, and according to the consulted experts many centres will nowadays perform ca. 200 interventions per year. Most centres dispose of ≥ 2-3 bariatric surgeons
- The follow-up is focused in the bariatric surgery during the first and in most counties also during the second year. The designated county hospitals receive a lump-sum, and are free to spend the money according to the key-resources deemed priority for their setting and situation. The follow-up rates are high (94% after 6 weeks; 85% after 1 year and 63% after two years) but highly vary between hospitals.
- The five-year follow-up is considered as a challenge with a nationwide follow-up rate in bariatric surgery centres of 51% (ranging from 0 to 83%). Since funding is lacking for follow-up after two years care is transferred to primary care. However there is a lot of variation. GPs/first line centres dispose of a fixed budget/payment. In a limited number of these primary care centres, follow-up is assured by clinical nurse specialists, under the responsibility of the GP.
- Sweden disposes of a nationwide, structurally funded and highly performant registry (the SOReg registry), in which data for >98% of all bariatric procedures are captured. The SOReg registry gathers demographic data, data on weight loss, complicatons, and also data on quality of life. Based on SOReg, quality indicators are publicly reported each year (with hospital disclosure) and numerous scientific studies have been published.
- Plastic body contouring surgery is only reimbursed in a limited number of cases which does not match the high need as experienced by patients.

Follow-up compliance

- Attrition rates to follow-up programmes are, especially from year 2 onwards, high with reported percentages as high as 89%. The attrition to follow-up is especially high among young patients and patients with a poor socio-economic context.

- **There is consensus that follow-up compliance helps to improve outcomes although sound evidence is lacking. Yet, there are indications that weight loss is higher among patients who comply with follow-up.**
- **Patients consider optimal care as personalized care that is easily accessible via e-mail, phone, etc. The possibility of ad-hoc contacts, tailored to their specific needs, should be offered complementary to the multidisciplinary structured follow-up appointments.**
- **Increasing compliance to follow-up appointments requires a multi-factorial approach including 'behavioral contracts', strategies to increase accessibility to care (e.g. remote interventions and monitoring); motivational interviewing and patient education;**

Volume-outcome

- **Reviews about volume-outcome relationships date back to the era that complication and mortality rates after bariatric surgery were higher than today. Based on the available evidence it was concluded that there was a clear association between surgeon volume and outcomes, while there were also indications for an association between hospital volume and outcomes. One review concluded that volume-thresholds differed between studies and hampered to set optimal volume thresholds. Another review performed a meta-analyses with >100 cases for high-volume hospitals and >50 cases for high-volume surgeons (and <25 for low-volume surgeon) as thresholds. The volume-outcome associations using these thresholds were confirmed.**
- **More recent studies seem to confirm these relationships although the evidence is not always consistent.**

6 SOLUTIONS ELEMENTS FOR THE ORGANISATION AND PAYMENT OF THE CARE OF BARIATRIC SURGERY IN BELGIUM

Disclaimer. This chapter reports about the process followed to draft improvement suggestions for the organisation of bariatric surgery care in Belgium. Based on the interpretation of the KCE, suggestions were made and stakeholder input was gathered. The final policy recommendations are not included in the current Chapter. We refer the reader to the synthesis in French and the Netherlands.

6.1 Introduction

As described in Chapter 1, the main aim of the current study is to formulate recommendations regarding the organisation and payment of the care for bariatric surgery patients. The focus is on care prior to surgery (pre-surgery pathway) and after discharge, including the long-term follow-up (post-surgery pathway). The care during the hospitalisation period is out-of-scope. In the previous chapters we described the current situation in Belgium based on an analysis of the grey literature, reimbursement rules and a qualitative study involving patients, physicians and other healthcare professionals. Next, we analysed the literature (care pathways and guidelines) to identify key interventions for organising and financing the care before and after bariatric surgery. Together with an evaluation of practices abroad, targeted literature searches (i.e. volume-outcome and follow-up compliance) and Belgian policy mechanisms used in other healthcare domains we drafted solution elements structured around 6 axes:

- Access to bariatric surgery;
- Bariatric surgery centres;
- Primary care;
- Patient engagement;

- Payment system;
- Bariatric surgery registry.

Each of this study components has limitations (see Box 6). As mentioned in the previous chapters, the evidence to support the organisation and payment of a bariatric surgery pathway is rather limited. The examples of abroad illustrate that also other countries struggle with this. Therefore, we used an approach combining the insights that result from analysing the available evidence with stakeholders and experts input/consultation:

- In a first step, the diagnosis of the 'current situation' was presented during a workshop to a limited number of healthcare experts (i.e. Two bariatric surgeons, 1 representative of GP's; 3 experts of the Belgian healthcare system). During a brainstorm the experts gave their input on potential solution elements for organisation and payment of the care relative to bariatric surgery;
- In a second step, the research team used the input from the experts, together with the insights obtained via the previous chapters to make a first draft of solution elements (available upon request). Each proposition was divided in several statements (e.g. starting with the underlying principle, then making the proposition more operational/concrete). These propositions were grouped around 6 axes (cfr. supra) submitted to a panel of experts via mail;
- In a third step, the draft of the solution elements was discussed with 32 experts (see colophon for details on the consulted experts[rr]) on a meeting on December 16th 2019. After the presentation, experts were asked to vote (level of agreement). The results were shown immediately after the vote and subsequently discussed. Based on this discussion (e.g. priorities, unclarities, barriers, facilitators) the propositions were re-drafted. It was not the aim to reach consensus. Nevertheless, the support for all presented statements was high. Therefore the modifications after the meeting were only minor. **The adapted version can be found in this chapter.** We made a distinction between recommendations (with a legal implication) and good practice examples (which can support a better care pathway in bariatric surgery).

The Final policy recommendations (not part of the Scientific report) are based on this chapter. A first draft was presented to Belgian stakeholders (sickness funds, patient organisations, hospital sector, physician syndicates, bariatric surgery organisations) on February 17th. Based on their input, the policy recommendations were finalised and presented to the Board of Directors of the KCE on March 17th 2020.

Box 7 – Main study limitations

- **Scope.** The study primarily focused on the inflow and follow-up of bariatric surgery patients. The study did not elaborate on the prevention and conservative treatment of obesity. This demarcation is somewhat artificial given the interconnectivity. Nevertheless, the current KCE study offers a basis for reform of the organisation and payment system for bariatric surgery patients. Given the magnitude of the problem and the medical, societal and economic implications further work on the prevention of obesity is indicated.
- **Evidence gathering.** The literature review was carried out in 2018 which can be outdated but the aim of this review was to obtain key elements to fill a further discussion by professional organizations and it will need whatever an update. Besides an in-depth analysis of existing guidelines and pathways and an analysis of four countries, the evaluated international evidence within this study relies on a rapid narrative review of two topics and an ad-hoc search for Belgium (grey and peer reviewed literature). Although this approach allowed us to integrate evidence evaluations on a broad range of topics, this also has methodological and practical limitations. As a consequence of the reliance on existing guidelines/pathways, it is possible that the most recent literature is missed. Another limitation is that the sifting of the literature and data extraction was undertaken by one researcher only and that no quality appraisal of studies was made for

[rr] Experts included bariatric surgeons, public authorities, allied health professionals involved in bariatric surgery; endocrinologists; general practitioners (were invited but did not attend the meeting, therefore they were asked to give feedback via mail).

the narrative reviews. Nevertheless, the consulted experts and the validators of the current study confirmed that the presented results reflect the current state of the evidence.

- We invested throughout the study in **expert and stakeholder** consultation (e.g. site visits, focus groups expert meetings and stakeholder consultation). Despite being invited (+ reminders), it was hard to involve general practitioners and other primary care providers to the same extent as healthcare professionals that are active in bariatric surgery centres. Nevertheless, the input from GP's was taken into account at each step of the study process.
- **Data analyses.** The data analyses rely on routinely collected data (i.e. IMA-AMI billing data). This has the advantage that the entire or large parts of the population are covered. On the other hand, there is a certain time lag (e.g. 2017 used as most recent year) and the level of detail is limited (e.g. no information on diagnoses, no link with ambulatory activities).
- For the **qualitative study**, a field mapping of patients and healthcare professionals was used to ensure that the different perspectives of key players were represented in the sample. Yet, this does not imply that the study results of this part of the research can be generalized to the included groups. This approach only allows an in-depth analysis of strengths, weaknesses and potential solution elements about bariatric surgery with a variability of viewpoints represented in the sample.

6.2 Access to bariatric surgery

Patient selection and decision for surgery

The KCE recommends to keep the current legal criteria for reimbursement but **complement them with additional legal criteria** for the eligibility for bariatric surgery. The KCE recommends to reinforce the multidisciplinary aspect of the decision for surgery:

- The multidisciplinary team that makes the decision for surgery encompasses at least the bariatric surgeon, physician in general internal medicine, gastro-enterology, endocrinology; psychologist/psychiatrist**; dietician** of the bariatric surgery centre. In addition the **general practitioner of the patient is consulted** (advice of the GP is compulsory but not binding).
- A **face-to-face** multidisciplinary concertation (video-conference possible) needs to take place in the decision making process for surgery for every patient. The GP is invited to this multidisciplinary concertation but can opt out and give his advice via a written report.
- The report of the multidisciplinary concertation meeting confirms that the patient is eligible (legal criteria are met) and that he/she understands the information about the surgery and the necessary lifestyle changes (i.e. the patient is able to repeat the in his own words). The patient is considered as an active partner of the multidisciplinary team during the decision making process.

To enable centres to fulfil these criteria the pre-operative consultations with dieticians and psychologists (see 6.6.1) should be reimbursed. In addition, reimbursement should be provided for the multidisciplinary concertation (see 6.6.2) conform the multidisciplinary concertation for oncology (i.e. nomenclature codes 350416-350420 participation multidisciplinary oncological consultation by a physician that is not part of the hospital staff; 350232 Explaining the diagnosis and the proposition of additional investigations, monitoring and treatment plan to the patient according to the report of the prior multidisciplinary oncological consultation during an individual consultation between patient and treating general practitioner)**.**

To the healthcare professionals involved in bariatric surgery the KCE advices:

- To gather elements on patients' motivation and patients' ability to engage themselves in lifestyle changes and follow-up required at long term. Before having access to bariatric surgery, t**he patient has to sign an engagement contract** with the multidisciplinary team (see section 6.5) in which he/she confirms that he will attend follow-up consultations.

Increasing utilization rates

The IMA-AMI figures clearly indicate that bariatric surgery rates continue to increase: from 7 552 (primary) bariatric interventions in 2009, towards 13 346 in 2017. It should be noted that the actual number of performed procedures is higher. After all, several centres also perform a substantial number of surgeries on patients coming from abroad (e.g. The Netherlands, England). In addition, revisions are not included and can be unevenly distributed across centres (e.g. some reference centres do much more revisions).

Legal criteria are insufficient

Currently, to be eligible for reimbursement of bariatric surgery the following criteria need to be met: adults with BMI≥40 or a BMI between 35-39,9 with co-morbidities (hypertension, sleep apnoea, diabetes), a documented diet of at least 1 year without sustainable success, an advice signed by surgeon, psychologist/psychiatrist and physician in internal medicine. During the qualitative study it was a recurrent theme that these criteria are insufficient to prepare patients for the post-surgical phase.

Variability across centres

A recent audit illustrated that the pre-surgery approach and decision is variable across centres (see Chapter 2): in some centres the psychologist has only a 'pro forma' role (signing the document), while in other centres, the psychologist acts more as a 'gate-keeper' (exclusion of patients with psychosocial contra-indications). In yet other centres psychologists take up a coaching role to support patients in need of psychological remediation and support.

The same observation holds for the role of dieticians (currently their advice is no legal criterion) for which variability is also high.

Despite that GP's are, 'theoretically speaking', in a good position (e.g. they know the medical and social history of the patient) to advice on surgery, their role in the decision making process is in practice mostly limited. The bariatric surgery centres that actively involve GP's in the decision for surgery are rare.

Bending the rules

Both patients, physicians and other healthcare professionals indicate that in some centres the legal criteria are bended (e.g. advice patients to gain weight to comply with the BMI-criteria) to operate as much patients as possible (see Chapter 3). Moreover, healthcare professionals and patients indicate that the negative advice from a team member (psychologist, dietician) is sometimes overruled by the surgeon.

Verification that patients capture and understand information and are willing to adhere

Several international organisations recommend to make the eligibility criteria for bariatric surgery more severe (see Chapter 4).

The care pathway should include a thorough assessment of the patient including motivation, medical condition, understanding of necessity lifestyle changes, etc. In England, France and Sweden it is required that not only the medical condition (e.g. acceptable pre-surgery risk) is stable, but also the psychological condition (See chapter 5). In addition it is recommended that it is verified (e.g. via checklists) if the patient captures and understands the

information that is given and that he is engaged to make the necessary lifestyle changes in a sustainable way. These criteria are cited in the literature, but not always applied in practice. In the Netherlands, it is required to attend an information session (in group) prior to the screening by a surgeon, psychologist, dietician, etc. Also exclusion criteria should be followed: no surgery when patient is not capable of self-care, lacks a social network or lacks the willingness to comply.

Large support among the consulted stakeholders to make the legal criteria more severe

The consequence of the too flexible criteria is that patients undergo surgery while they are not committed enough (or not enough prepared) to make the necessary lifestyle changes. This was confirmed during the expert meeting (16/12/2019). Moreover, 75% of the attending experts agreed or strongly agreed to make these criteria more stringent.

Multidisciplinary face-to-face concertation

90% of the consulted experts (16/12/2019) agree or strongly agree to make a face-to-face (or via video-conference) multidisciplinary consultation compulsory for every patient. A prerequisite to make it work is, according to the consulted experts, to provide a reimbursement for this multidisciplinary concertation (analogue to that in oncology: 'multidisciplinary oncology consultation').

Mandatory involvement of dieticians and GPs

The implication of the advice of both dieticians and GP's in the decision making process is an international recommended practice (Chapter 4). 78.5% of the Belgian experts (16/12/2019) indicated that the dietician should be mandatory included in this process, while this was only 54% for the implication of GP's. The discussion revealed that almost everyone agreed with the principle to involve the GP. After all, they know the medical/social history of the patient and are well placed to take up an important role in long-term follow-up when patients are discharged from the bariatric surgery centre (after 2 to 5 years of follow-up). Yet, there are many practical implications and barriers that need to be overcome to make this work (e.g. lack of time and motivation GP's to attend or participate, patients without a GP). Experts advised to make it compulsory to invite GPs to the multidisciplinary consultation but leave the choice to them to participate (face-to-face, video-conference or written report). It was also stressed that GP's advice should be compulsory but not binding (i.e. no gate-keeping).

6.3 Bariatric surgery centre

The bariatric surgery centre has a prominent role in the care pathway for bariatric surgery. We structure the solution elements in 4 sections: multidisciplinary team; coordinator; volume-threshold; standardized care-pathway.

6.3.1 Multidisciplinary team Bariatric surgery centre

Multidisciplinary team

The KCE recommends that the core team of a bariatric surgery centre includes **at least two surgeons, a physician in internal medicine, gastro-enterology or endocrinology, a dietician[ss] and a psychologist or psychiatrist.** After 2 years, it should be assessed if patients would benefit from further specialized follow-up (up to five year) or if care can be handed over to primary care. Also after handing over care to primary care, patients can be referred back to the bariatric centre for specific follow-up.

The role of **coordinator** (see 6.3.2) is assigned to a member of the core team (e.g. dietician) or to an additional team member (e.g. nurse with expertise in bariatric surgery). **All involved health care professionals have a demonstrated expertise in the field of bariatric surgery** (see

[ss] The role of 'nutritional physicians', which exists in Belgium, in these multidisciplinary needs to be further evaluated and discussed within the context of the professional organisations involved in bariatric surgery.

6.4. training in primary care). The multidisciplinary team can, in case the patient requires it, consult or call in support from the other disciplines available within the centre or hospital network:

- Physiotherapist with experience in the field of obesity;
- Physicians specialized in psychiatric and mental conditions (e.g. eating disorders, substance abuse and addictions) if a psychiatrist is not part of the core team, gynaecology, cardiology, pneumology, etc…..

The team has agreements (e.g. care pathway, referral patterns, multidisciplinary concertation) about collaboration with:

- Primary care (a structure within primary care (e.g. [care councils in Flanders] of the region with reference persons in the field of obesity and bariatric surgery)
- Specialized obesity centres (within or outside the own hospital; within the loco-regional hospital network) who offer a conservative treatment.
- A centre (within or outside the own hospital; within the loco-regional hospital network) where reconstructive surgery is performed (e.g. Excess skin).

The **patient** is considered as a partner of the multidisciplinary team.

Not all Belgian centres have a multidisciplinary team with sufficient bariatric expertise

The multidisciplinary teams in Belgian bariatric surgery centres are very heterogeneous (see chapters 2 and 3). In some centres there is a very large team including the full range of healthcare professionals (bariatric surgeon, endocrinologist, dieticians, psychologists, physiotherapists, nurses) all with dedicated time and expertise for bariatric surgery. In other centres there is no dedicated multidisciplinary team at all. The bariatric surgeon consults general dieticians and psychologists. Patients and healthcare professionals (see Chapter 3) indicated this lack of specific expertise in bariatric surgery as a major shortcoming. This was confirmed during the expert meeting (16/12/2019) where 97% of the participants agreed that a multidisciplinary team of a bariatric surgery centre requires to see a 'critical mass of patients each year' to build up and maintain this expertise.

Physicians, dieticians and psychologists

The examples abroad illustrate (see Chapter 5) that besides bariatric surgeons (at least two to ensure continuity of care) and physicians in internal medicine also dieticians and psychologists are core members of the multidisciplinary team. In some countries the advanced practice nurse (or clinical nurse specialist) is also part of the team and takes up the role of coordinator. This is confirmed by the analysis of the international guidelines (see Chapter 4) where it is also stipulated that these teams collaborate with primary care.

According to the analysis of the guidelines and pathways (Chapter 4), the multidisciplinary team has the main responsibility in the follow-up (medical, psychological, nutritional, etc.) during the first two years post-surgery. Of the consulted experts (16/12/2019), 97% agreed with this timeframe (i.e. 2 years as a minimum) for follow-up by a bariatric surgery centre.

Follow-up includes medical, psychological, nutritional and behavioural aspects of care

The multidisciplinary team (see Chapter 4) will manage (especially during the first two years) medical, psychological, nutritional and behavioural aspects of care. Besides education and coaching also behavioural therapy and support is needed to achieve the necessary lifestyle changes. Patients also have to be supported (e.g. by a physiotherapist) to increase physical activity, exercise and sport and get support in case of substance abuse or addiction (e.g. alcohol, smoking). Yet, the patients and healthcare professionals (see Chapter 3) indicate that in several Belgian centres the follow-up is limited to the medical aspects of care. When support by dieticians is given, this mainly focuses on the 'technical aspects' of the diet rather than on practical tips and behavioural change.

Collaboration with centres specialized in conservative treatment of obesity

Bariatric surgery is not a first line treatment. The Belgian legal criteria also foresee that patients have followed at least during 1 year a diet without success. Yet, the intensity of these diets vary (see Chapter 3). Examples from abroad show that in some countries there are mandatory collaborations between bariatric surgery centres and obesity centres specialized in conservative treatment (sometimes sharing a part of the staff) or with primary care teams responsible for the conservative treatment (see Chapter 5). The intensity of the collaboration and the mandatory character differs. In England, patients are only eligible for bariatric surgery when they have followed a specialized treatment in an obesity centre. Yet, this might contribute (together with a limited budget available for bariatric surgery) to the observed under-utilization of bariatric surgery. Also in France there were attempts (in the context of a national Obesity Plan) to reinforce the multidisciplinary approach of obesity by installing *'Centres Spécialisés Obésité (CSO) – Obesity Centres*'. Yet their success was variable (also related to a lack of sustainable funding) In the Netherlands, the GP is responsible for the conservative treatment and the referral to the bariatric surgery clinic.

6.3.2 Coordinator

Coordinator of the bariatric surgery care pathway

The KCE recommends that in each bariatric surgery centre a coordinator is appointed (cf. convention: 6.6.2). The coordinator is a dietician, nurse or psychologist with expertise in bariatric surgery care. The coordinator is responsible for the organisation of the multidisciplinary bariatric concertation, is a point of contact for patients, organises information sessions, monitors follow-up and is responsible for the bariatric surgery registry. Part of this role (e.g. contacting patients to attend follow-up appointments, practical organisation of meetings and contacting GP's, data input in the registry) can be delegated to administrative staff. The KCE recommends that the professional organisations involved in bariatric surgery (e.g. BASO, BESOMS, BBAHS) jointly draft a profile description for this role.

This coordinator can be financed via a lump sum as part of the convention (the amount of the lump sum can vary across hospitals depending on the volume as well on follow-up attendance rates they obtain).

The duration of the follow-up coordinated by the bariatric centre is 2 years. Then there is hand over to primary care (cf primary care 6.4), unless more intensive and/or specific follow-up remains required.

Cost-effective intervention that requires long-term follow-up

The recent HTA-report published by the KCE[1] confirmed that bariatric surgery is a cost-effective intervention in case of severe obesity. Yet, at the individual level a systematic and multidisciplinary follow-up is necessary to detect potential side-effects and complications at an early stage in order to remediate them as well as to support patients (e.g. coaching, behavioural therapy, patient education) to adopt and maintain the necessary lifestyle changes.

Follow-up care in Belgian bariatric surgery centres is highly variable

Based on the interviews (see Chapter 3) with patients and health care professionals as well as on a recent audit[25], it seems that the focus of follow-up in Belgium is medical and mainly performed by the bariatric surgeon. The other aspects (team composition, frequency, duration, type of interventions) are highly variable. Moreover, when a multidisciplinary approach is followed it is often experienced as too 'technical'. Patients indicate that they want more practical tips and coaching from the dietician to change their diet and eating behaviour.

Bariatric surgery centres have to take the lead in the first two years post-surgery

Based on the analysis of existing practice guidelines and care pathways (Chapter 4) we can conclude that a follow-up by the bariatric surgery centre needs to encompass at least two years with at least 4 consultations during the first year post-surgery, one or two consultations in the second year. The frequency of the follow-up appointments needs to be tailored to the patients needs. Aspects of care that need to be monitored are medical (e.g. comorbidities, side effects, complications, medication management, lab tests, etc.), nutritional aspects and eating behaviour, coaching, psychosocial assessment (and support/therapy if indicated), patient education etc.

Hand-over of the coordination to primary care after two years

The timeframe of the post-surgery follow-up by a bariatric surgery centre is two years in England and Sweden, after which the responsibility for the follow-up care is transferred to primary care (see Chapter 5). Yet, since many problems only appear (e.g. weight regain, substance abuse) after a period of two years the period of specialised follow-up is longer in the Netherlands (i.e. 5 years with collaboration with the primary care). The consulted experts (16/12/2019) agree to have the focus of follow-up care in the bariatric surgery centres during the first two years. After two years the responsibility can be transferred to the GP (preferably the GMD-DMG holding physician[tt]). In case of problems *(e.g. Psycho-social problems, need for additional nutritional support and advice, complications, weight regain)* the specialised care can be continued (or re-started) at the bariatric surgery centre.

High attrition rates for follow up

A large problem in follow-up of bariatric surgery patients is the high attrition rates: reported in the literature to be between 3% and 89% depending on type of surgery, nature, frequency and duration of the prescribed follow-up (see Chapter 4). The interviews with patients and health care professionals confirm this problem (see Chapter 3). Besides during the pre-surgery pathway (e.g. obligation to consult a psychologist), there are no hard incentives to persuade patients to attend follow-up appointments. Patients often do not see the need (or too late) because they have no complaints. Based on the audit[25] it appears that already from the second post-operative consultation a problem of high attrition rates emerges. This is possibly due to the non-reimbursement of consultations with psychologist and dietician. Nevertheless, there is also a lack of active approaches to increase follow-up rates (e.g. contacting patients by telephone when they do not show up).

A coordinator to increase follow-up rates

In Sweden and the Netherlands attrition to follow-up care seems to be limited (see Chapter 5). A potential explanation is that the follow-up rates are monitored by the bariatric surgery registry and that results per hospital are publicly disclosed. This stimulates centres to work with coordinators who actively contact patients to attend follow-up appointments.

Patients also indicate that they experience a need to contact a healthcare professional with whom they are familiar with ad-hoc questions (e.g. via phone or mail) (see Chapter 3). The experts (97% agreed) supported the idea of a coordinator to: organise multidisciplinary concertation, contact GPs', be point of contact, organise information sessions, monitor follow-up compliance, manage the bariatric surgery registry. Yet, the discussion

[tt] In Belgium GPs receive a lump sum payment for patients that have their 'global medical file' with them. Patients in return receive a reduced co-payment. This policy measure was taken to increase the number of beneficiaries with a GP.

revealed that some of the aspects require a clinical background while other activities (e.g. organising meetings, data input in the registry, contacting patients in case of no show) are more of an 'administrative, clerical' nature. While a clinical coordinator might be responsible for the care pathway coordination, some of the tasks might be delegated to administrative staff.

6.3.3 Volume-thresholds

Minimal volume threshold per centre and surgeon

In order to ensure safe care and sufficient multidisciplinary expertise for long-term follow-up, the KCE recommends to limit bariatric surgery to centres and surgeons that meet minimal volume thresholds:

- Centres should at least perform 100 bariatric surgery interventions and the corresponding pathway per year;
- At least two surgeons per bariatric surgery centre have sufficient expertise in bariatric surgery (each perform at least 25 bariatric surgery interventions per year);

In the context of loco-regional hospital networks agreements should be concluded on which of the hospital sites bariatric surgery will be performed. During the start-up phase (max. 3 years), the possibility should be offered to merge caseloads of hospital sites to meet the requested volume thresholds. It is important that hospital networks do consider, besides the volume-threshold, other criteria in this decision such as accessibility of care and the availability of multidisciplinary expertise (e.g. psychologists, dieticians).

The volume thresholds should be met per hospital site. The volume-thresholds per surgeon can be met by surgeons even when they are performing operations in several hospital sites. All volume-thresholds are based on primary interventions and step up re-interventions.

Caseload in Belgium vary considerable between Belgian hospitals and surgeons

The caseload of primary bariatric surgery interventions in Belgian hospitals (average on 3 last years) varies from 3 to 833 (mean: 131; median: 100). From the 50 hospitals with less than 100 surgeries per year, there are 28 hospitals with less than 50 interventions per year. It should be noted that these figures are calculated per hospital and that one hospital can have different sites on which they perform bariatric surgery.

Also the number of interventions per surgeon (chief executer of the surgery) varies. There were 301 different surgeons performing bariatric surgery with an average of 50 interventions per surgeon (median: 25). There are only 44 hospitals with two surgeons who have at least 25 interventions per year.

Evidence supports volume-outcome relationship but not all study results are consistent

Reviews about volume-outcome relationships that supported a volume-outcome relationship (hospital and surgeon) date back to the era that complication and mortality rates after bariatric surgery were higher than today.(see Chapter 5) While primary studies use different thresholds, thresholds (>100 cases for high-volume hospitals and <25 for low-volume surgeon) were fixed in a meta-analysis. The volume-outcome associations using these thresholds were confirmed. More recent studies seem to confirm these relationships although the evidence is not always consistent. While most studies confirm the volume-outcome relationship, there are also some null findings (see Chapter 5).

Some countries have mandatory volume thresholds

Abroad, there are examples of mandatory and voluntary volume-thresholds. In the Netherlands the most far-reaching volume-thresholds are implemented. Each of the 19 bariatric surgery centres have to perform at least 200 interventions per year. Moreover, each centre needs to have at least two surgeons who perform two types of interventions (Roux-en-Y bypass and SG) and reach a yearly caseload of 30 cases per surgeon. In Sweden and France, there are no mandatory volume-thresholds. Yet, there are efforts to increase caseloads per centre (e.g. in France via a voluntary accreditation system). A recent study conducted in France concludes that outcomes were better in bariatric surgery centres that performed more than 200 interventions per year.[126] In England, volume-thresholds (100 per centre and 50 per surgeon) are defined. Yet, in practice some flexibility is allowed to prevent that the already low utilization rates do not further decrease.

Box 8 – Hospital reform: loco-regional and supra-regional networks

In 2015 the Minister of Public Health started a reform of the hospital landscape aiming to enhance task distribution between hospitals (e.g. concentration of complex care or high-cost technologies in a more limited number of hospitals) and rationalize the supply of general hospital services. An important policy lever to achieve these goals is the introduction of geographically defined hospital collaborations, the so called '"loco-regional clinical networks"'. Indeed, early 2019 a law was voted that will makes it compulsory for hospitals to be part of a loco-regional hospital network from 2020 onwards. These loco-regional networks (max. 25 for the Belgian territory) will have to make arrangements about general hospital services such as maternity units, paediatric services, emergency departments, etc. In addition, the law stipulates that for certain services (e.g. complex cancer surgery) loco-regional hospital networks have to make arrangements with hospitals outside the network. These are called 'supra-regional' collaborations.

Volume-thresholds to eliminate the very small centres and to allow the establishment of multidisciplinary teams

Despite the available literature and the thresholds used in other countries, fixing volume-thresholds remains to a certain degree an arbitrary process. Yet, there is large consensus among the Belgian experts that a critical mass of patients per year is required (97% agreement on 16/12/2019) to ensure that high-quality multidisciplinary care is given. This is based on the 'practice makes perfect' principle and the fact that a multidisciplinary team with specific expertise in bariatric surgery is required. This cannot be accomplished when only a handful of patients are operated each month. Based on the examples abroad and in the literature, the KCE proposed a minimal annual volume of 100 cases per centre and 25 cases per surgeon. There was large agreement among the consulted experts: 80% agreed to set the volume threshold per centre to at least 100 per year and 85% agreed with a threshold of at least 25 interventions per surgeon (20% and 10% agreed with the principle of a threshold but preferred a lower number for hospitals and surgeons, respectively). Discussions revealed that some preparatory work is required to fix the thresholds. An example is the identification of procedures. Besides counting the primary bariatric surgery interventions also step-up re-interventions have to be counted. After all, in some reference centres the proportion of these re-interventions is higher (e.g. referred from other centres that mainly perform bariatric surgery). Since re-interventions are more time consuming this could lower their total volume (less time available to perform primary interventions). A same argument was made for bariatric surgery related complications (e.g. intestinal obstruction). These are often referred to 'reference centres'. While dealing with these 'complications' do not result in a 'bariatric surgery intervention', it requires time from a surgeon with bariatric expertise. Yet, including these interventions in the volume threshold will imply that the volume criterion becomes too vague to apply in practice. Therefore, it seems indicated to only include primary bariatric interventions and step-up re-interventions (e.g. from sleeve to bypass, from gastric banding to bypass) in the volume thresholds.

While for hospitals it seems important to achieve the caseload per site (e.g. to have a multidisciplinary team available on site), this does not hold for the surgeons (a surgeon can obtain the required volume by performing surgery at different sites.

Transitional measures are indicated. Surgeons (e.g. new in the discipline) that do not meet the required caseload can join an experienced team (where two surgeons already meet the required caseload) to gradually become more experienced and meet the threshold after some time. For hospitals it seems indicated to allow a transitional period (e.g. max. 3 years) in which hospitals from a same loco-regional network (see text box) can join forces and make arrangements on which hospital sites (one or more per hospital network) they establish a bariatric surgery centre and meet the volume thresholds. In this decision making process other criteria (i.e. accessibility; availability of a multidisciplinary team with expertise in bariatric surgery; agreements with primary care) should be considered. In any case, the follow-up of quality of care (see bariatric registry in 6.7) is required to monitor and fine-tune this reform.

6.3.4 *Identify key-interventions for a care pathway*

The KCE recommends that **the professional organisations involved in bariatric surgery (e.g. BASO, BESOMS, BBAHS) draft a national consensus document** with identification of the key interventions for the multidisciplinary follow-up post-surgery. The results of the literature review included in this study can be used, after an update, as a basis for discussion. Some key interventions have to be highlighted.

Preoperative period

The multidisciplinary team performs a comprehensive evaluation of the patient, including at least the following:

- Medical (weight/BMI trends, comorbidities, medical reasons to exclude patients from surgery, substance abuse and medication use), nutritional (eating behaviour with identification of eating disorders, macro- and micronutrients deficiencies, mastication capacity) and psychological assessment (severe mental health disorder, areas of vulnerability and positive factors);
- Additional consultations with medical specialists according to patients' characteristics and comorbidities;
- Lab tests (blood type, complete blood count, fasting blood glucose, lipid panel, liver function test, renal function, vitamins and minerals, PTH and pregnancy tests for all female patients of childbearing age).
- Few technical examinations if indicated.
- Verification of recommended cancer screenings depending on age and risk factors (e.g. colorectal cancer; breast cancer).

The preparation programme proposed by the multidisciplinary team encompasses at least the following:

- Information and thorough discussion between the surgeon/MTD team members and the patients, with person's family as appropriate (surgery options, risk-benefits, need of lifestyle modification and follow-up compliance); informed consent document in the patient record.
- Use of educational support (group sessions with peers, local patient support group, social media) with specific support for patients with cognitive difficulties.Nutritional counselling tailored to each patient (development of new skills and improvement of nutritional status before surgery)
- Physical activity at a regular basis adapted to the patient's musculoskeletal and cardio-pulmonary conditions, lifestyle and preferences.
- Smoking cessation (preferably at least 6 weeks before surgery) and alcohol abstinence in case of dependence (at least 1 year before)
- Support by psychologist/psychiatrist specialized in bariatric surgery and obesity: for the management of preexisting disorders (if any)and toenhance patients' motivation and ability to comply with nutritional, behavioural and psychological changes before and after surgery.

- Management of some co-morbidities to reduce the risk of the surgical procedure: diabetes, hypothyroidism, hyperlipidemia, OSA syndrome, DVT and gout.
- Gyneacology advices: e.g. fertility (that can increase after surgery), pregnancy (that should be avoided before and 12-18 months after surgery) and contraception (with discontinuation of oestrogens)

Postoperative period

The multidisciplinary follow-up includes at least 4 consultations during the first postoperative year, two during the second year and a yearly consultation from the third year onwards. The frequency and intensity of follow-up needs to be adapted to the type of surgery and patient needs/comorbidities but includes at least the following:

- Medical (e.g. weight, comorbidities, complications, quality of life and assessment of medication), nutritional (e.g. diet, vitamin and mineral intake, compliance with behavioural changes, impact on practical life and wellbeing) and psychological follow-up (e.g. screening for problems with self-image, depression, substance abuse, motivational problems).
- Lab tests (complete blood count, vitamins and minerals, PTH, glucose, liver and renal tests).
- Bone Densitometry (DEXA)

The multidisciplinary program follows **a stepped-care approach** and is adapted based on the evolution of the patient's condition and the degree he/she is capable to self-care. Among others, interventions in the following domains might be required:

- Education/coaching/behavioural therapy: e.g. adjust eating pattern, promote physical activity and exercise;
- Nutritional counselling : e.g. protein intake, vitamin and mineral supplements (at least vitamins B1, B9, D, calcium, iron, zinc, copper and selenium);
- Psychological support and treatment: e.g. self-image; post-operative alcohol/substance use disorders, depressive illness, risk of suicide;
- Physical activity (min 150 min/week) with potential support by physiotherapists, group sessions…;
- Adaptation of prescribed medications;
- Gynaecology follow-up: e.g. anticonception, preconception counselling and advice regarding nutritional supplements; specific dietary advice, nutritional monitoring and vitamin/minerals supplementations if pregnancy.

No standardized approach for follow-up

Due to the criteria for reimbursement there exist (although insufficient) minimal criteria for the pre-surgery phase. For the post-surgery phase this is not the case. The follow-up care is very heterogeneous: composition teams, frequency and content follow-up appointments, lab testing, education sessions (individual, group), etc. Aspects of care that seems to be very differently organised (both in Belgium as internally) are psychological assessment and support to increase physical activity (e.g. by a physiotherapist versus private market). The latter is not only needed to maintain weight loss but also to prevent muscle loss.

The interviewed patients and healthcare professionals (see Chapter 3) indicate that the focus is on the medical aspects of follow-up while there is also a clear need for psychosocial, nutritional follow-up.

GPs, bariatric surgeons and other healthcare professionals (see Chapters 2 and 3) indicate that there is a need to identify minimal key interventions for a care pathway. These interventions do not exclude that care is adapted to patients' needs.

International guidelines and care pathways are mainly consensus based

The analysis of existing guidelines and care pathways reveals that these are largely consensus based (due to absence of sound evidence for most key-interventions). The consulted Belgian experts (16/12/2019) agree or strongly agree (97%) that also for Belgium a nationwide consensus about key-interventions is required. This is an assignment for the Belgian professional organisations in the field of Bariatric surgery (e.g. BASO, BESOMS, BBAHS). This Belgian consensus process can build on the work of Chapter 4 where the existing guidelines and pathways are summarized.

There seems to be congruence in the guidelines/pathways (see Chapter 4) to have at least 4 consultations during the first year. The first contact is organised after 2-4 weeks. The frequency and content of these consultations need to be tailored to the needs of the patient (e.g. comorbidities) and the type of the intervention. Follow-up care is organised by the multidisciplinary team of the bariatric surgery centre (with rapport to the GP).

Follow-up care includes medical (weight, comorbidities, complications), nutritional and psychological care. The guidelines recommend to monitor lab tests (complete blood count, Iron/ferritine/transferrine, albumin/prealbumin, vitamin B12, vitamin D, Ca, PTH, glucose, liver and renal tests) and to perform a Bone Densitometry (DEXA). Other examinations (such as CT, endoscopy, and echo abdomen) need to be done only when patients have particular symptoms or risk factors. Supplements (vitamins and minerals) are integral part of the follow-up treatment: vitamins B1, B9, D, calcium, iron, zinc, copper, selenium and, in case of malabsorptive surgery also vitamins A and B12.

The guidelines also point out that pregnancy after bariatric surgery is best postponed for at least 12-18 months post-surgery. The anatomical changes do require that anticonception is adjusted. In addition, patients that become pregnant need a specific follow-up by the gynaecologist.

Stepped-care approach

The guidelines suggest (see Chapter 4) a stepped-care approach. This means that the intensity of follow-up care depends on the condition/needs of the patient: self-management skills, eating patterns, motivation to exercise, etc.

Besides education and information, there is a clear need for coaching and behavioural support/therapy to enable patients to adopt and maintain the necessary lifestyle changes (e.g. increasing physical activity, changing diet and eating patterns).(see point patient engagement 6.5)

6.4 Primary care

Increased involvement primary care

The KCE recommends to include the **primary care system** in a structured way in the care of patients undergoing bariatric surgery in order to ensure high quality management. This model implies recommendations and several good practice examples:

Recommendations

- Agreements between bariatric surgery centres and primary care structures [e.g. care councils in Flanders] including referrals, education of healthcare professionals, etc. These arrangements could also facilitate contacts between secondary and primary care from the same geographical area and take the lead in developing local protocols to assess patients and refer them to the bariatric centre. Pilot projects in this domain should be encouraged.
- All patients that are included in a bariatric surgery pathway preferrrably have a ‘global medical record (GMD-DMG)’ with a GP

Good practice examples

- The general practitioner (GP) is the coordinator of the patient care in primary care. This requires some adjustments such as the implication of a GP from the preoperative phase onwards (within discussions of MDT and decision-making cf. 6.2) and a fluent communication system between primary and secondary care-givers.
- GPs and other primary and secondary care providers (e.g. dieticians, physiotherapists, psychologists/psychiatrists…) are offered an appropriate training (both in academic curricula and life-long learning programs) in obesity and bariatric surgery; incentives (including accreditation, specific qualification) to involve healthcare professionals in the training are also foreseen.

Several practical tools should be provided to the healthcare providers in order to ensure their role. These tools encompass clinical support (e.g. quick checklist for assessing the patients eligibility; guidance on the different steps of the follow-up; consensus list of post-operative problems that require a (fast) referral to secondary care **(list of red flags))** but also IT-system to keep track of patients' progress and participation in the care pathway (e.g. Automated reminders and decision-aids within the EPR, electronic "app", etc.). The bariatric surgery centres and societies play a pivotal role to support the content of these tools.

Current caseload of bariatric patients in primary care practices is limited and expected to increase

The caseload of patients with bariatric surgery per GP varies in Belgium but it is on average relatively low. According to IMA-AMI, the average number of bariatric patients by practice in Belgium is 6 in solo practices (or 9 per solo practice with minimally 1 BS patient), 20 in group practices and around 24 in community health centres. (See Chapter 2)

Because of the increase of bariatric surgery (in the period 2009-2017 a yearly increase of 7.5% was observed - totalling an increase of 76%), this average is expected to grow.

GP's are often not (or only limited) involved in the bariatric surgery pathway

In Belgium, the GP's involvement both in pre and post-surgery is often low. In the preoperative period, most patients refer themselves to a bariatric surgery centre. According to the qualitative study, some patients have no GP or bypass their GP because they want to avoid time loss and/or a negative advice (See Chapter 3).

Many GP's regret that they are not formally implicated in the decision process about surgery. Indeed centres that actively contact GP's (invitation to join the multidisciplinary concertation by letter and follow-up contact by phone) are the exception. GP's indicate that the dispersion of bariatric surgery centres (i.e. nearly all hospitals perform bariatric surgery) is a potential cause of not being involved in the decision making process. Some specialised centres, on the other hand, indicate that it is too cumbersome to implicate GP's into the multidisciplinary concertation. Surgeons mention that they organise local meetings and provide written instructions to the GP's for the patients' follow-up but without success: GP's don't always know or recognise the need of the patients (e.g. vitamin supplement) (See Chapter 2).

In the post-operative phase, there is, in most cases, written communication between the specialized bariatric centres and the GP but the GP's indicate that there is too little guidance about follow-up. Even for issues that can typically be performed by a GP (e.g. blood tests to screen for nutritional and metabolic problems) there is no clear guidance. Moreover, only few patients visit the GP specifically in the context of bariatric surgery follow-up. They consult the GP's for other reasons.

Important potential role of primary care in pre- and post-operative phases

Both in the literature and by Belgian experts it is emphasized that the GP's have an important role to play in the management of obesity and bariatric surgery. In the preoperative period, several tasks such as referring patients to the bariatric surgery centre or describing potential benefits and risks of bariatric surgery can be done by a GP. The GP's participation in the decision-making process can be highly relevant since GP's have, in general,

a broad view on medical, psychological and socio-economic context of the patient, the history of the obesity and the past weight loss attempts. Patients confirm this (see Chapter 3).

Some French bariatric centers, for instance, invite GP's to the multidisciplinary preoperative concertation meeting (see Chapter 5). During the discussion on the expert meeting (16/12/20219), all experts agreed with the 'principle' to imply a GP in the pre-operative phase. Yet, they prefer that it is a 'soft measure' because some GP's have a very negative opinion about bariatric surgery or cannot (e.g. time constraints) or want to invest time in multidisciplinary concertation (see point 6.1.2).

During the post-operative phase, they consider primary care providers (GP's, dieticians, physiotherapists, psychologists, nurses) as essential to support the patient management (including identifying severe complications after surgery, referring patients when needed or supporting the patient adherence to the follow-up). The GP is considered, both by the literature and the Belgian experts, as the preferred professional to coordinate the follow-up (especially at long term).

Challenges to improve the involvement of GP's and other primary care providers

In practice, it is not easy to involve primary care in the pathway of bariatric surgery. Among the 4 countries analysed, none demonstrate the routine implication of the GP in the preoperative phase, the decision-making or the follow-up (see Chapter 5). In the Netherlands, the role of the GP prior to the operation is mainly to provide conservative treatment for obesity and to refer the patient to a bariatric surgery centre. The preparation for surgery is given by the bariatric surgery centres. After 5 years of follow-up by the bariatric surgery centre, the GP is responsible for the follow-up: i.e. contact with the patient at least once a year in order to support the necessary lifestyle changes, verify intake of the vitamin supplements, perform lab tests, etc. In England, GP's play a pivotal role in the management of obesity but they cannot refer patients directly for bariatric surgery. They have to refer them to a specialized centre for conservative treatment. For the follow-up, shared care is recommended by NICE but not really implemented in practice. During the first two years, the specialized centres manage the follow-up and the role of GP's is limited to recognizing potential signs and symptoms of complications (sometimes also responsible for lab testing). After two years, the GP is asked by the center (via a discharge letter) to annually perform blood tests and refer back in case of concerns. In France, the involvement of GP's is limited both in the pre and post-operative phase. In Sweden, the long term follow-up (after one to two years at the bariatric centre) is transferred to the GP's but in some primary care centres this follow-up is assured by clinical nurse specialists, under the responsibility of the GP.

Lack of knowledge about obesity and bariatric surgery

Primary care providers (GP's but also dieticians, psychologists, physiotherapists) often lack specialized knowledge and expertise regarding obesity and bariatric surgery including about the benefits (e.g. weight reduction, health gains), disadvantages (e.g. complications, post-operative mortality, psychological consequences), signs and symptoms of potential complications, implications on, for instance, anti-conception, pregnancy, medication use [27]and important aspects in the follow-up of the different types of bariatric surgery. This lack of expertise is acknowledged by the Belgian GP's themselves (see Chapter 2) and mentioned by other professionals, patients, experts (see Chapter 3) and within the literature (see chapter 4). This can have several implications such as a wrong advice or a too late referral to specialized care in case of problems (i.e. the GP doesn't recognize the 'red flags'). Training of GP's and other primary care providers is highly recommended (in the literature and by the Belgian professionals and experts). This training should not only focus on BS but also on obesity. A specific attention should go to red flags and how GP's have to refer back patients to the bariatric team in a timely and appropriate manner; specific knowledge in bariatric nutrition, screening for eating disorders, and psychosocial assessment for dieticians ; and specialized knowledge, experience and training relevant to obesity, eating disorders and bariatric surgery for psychologist.

Lack of time and resources

In France, besides the lack of knowledge, GP's evoke a lack of available time and reward to explain their insufficient involvement in the bariatric surgery pathway (see Chapter 5). In Belgium, GP's mention they have no incentive to follow trainings on bariatric surgery and that they should receive a financial compensation for the time spent both on training and coordinating the follow-up of operated patients (as for the diabetes care trajectory, See Chapter 2). On the other hand care coordination can be considered 'being part of the job' and also applies to other patient groups (e.g. geriatric patient, cancer patient).

An accreditation system is also mentioned by and for other healthcare professionals (dieticians, psychologists, physiotherapists) in order to create and to recognize their expertise in bariatric surgery (see Chapter3). This concerns also the secondary care.

Limited communication between bariatric centres and primary care providers

Hospitals and GP's (or primary care providers in general) do not always collaborate in an optimal way. According to the patients' interviews, the communication between the bariatric centre and the GP is often limited and slow (See Chapter 3). GP's also mention they are insufficiently informed by the bariatric centre (see Chapter 2). More collaboration between different disciplines in the (pre-) and post-operative care pathway is needed to ensure a pre- and post-operative management of high quality. Improving the written guidance in combination with invitation for multidisciplinary consults by the specialized centres is advocated by Belgian GP's (see Chapter 3).

Possible organisational solution

Among the models proposed in the literature for long term care after bariatric surgery, the shared care model is particularly emphasized by the Belgian experts. In this model, the patient's care is shared between the bariatric centre (the MDT team) and the GP (or better the MDT primary care team) according to a model of chronic disease management. This implies a real *'transmural organization'* with individual roles agreed for what should be achieved at each appointment. This model requires robust systems of communication. The **electronic patient record** (EPR) should be useful for sharing patients' data between the different healthcare providers. In order to increase both the GP's and the patients' involvement in the bariatric surgery pathway, it is proposed to request as an additional inclusion criterion that the patient preferably has a global medical record (GMD-DMG) in a designated GP. This requirement already exists for patients with diabetes and it was assessed as being effective by the Belgian experts (16/12/2019). Moreover, this can be useful for many patients without a GP who now may refer themselves to one or more bariatric surgery centres directly. The patient's access to the digital "tools to communicate" should be conditioned to the option "GMD-DMG".

In order to facilitate this kind of model, some authors suggest to develop **local exchange platforms**. These platforms would allow easier contacts between secondary and primary care from the same geographical area and the developpement of local protocols to assess patients and refer them to the bariatric centre (See Chapter 4). The network concept of primary care professionals with specific expertise in surgery did not received many support during the discussion on the expert meeting (16/12/2019): 40% neutral, 33% (strongly) agree and 27% (strongly) disagree.

Need of practical tools

Because the assessment of obese patients is difficult after recent bariatric surgery and because general practitioners can be confronted with some difficulties, some content has to be defined and provided to them, as a quick checklist for assessing eligibility criteria in the preoperative period, a guideline with the content of the assessment and advices to be provided at each step of the follow-up, a quick detection tools for problems needing referrals in the post-operative phase, etc.

Automated reminders and decision-aids within the EPR should support the GP's in their coordination of the follow-up. IT-system would help physicians and other health care professionals to keep track of patients' progress and participation in the care pathway. Electronic "app" are suggested by Belgian HCPs to help them to communicate with the centre and the patients (See Chapter 3).

Other tools are also mentioned in the literature in order to support training and knowledge transfer towards HCPs such e-learning modules or teamwork and group discussion on feedback (See Chapter 4).

The bariatric surgery centres and societies can take up a role in the development of these tools (i.e. expertise about content).

6.5 Patient engagement

Preoperative period

The KCE recommends to obtain a real informed consent from the patient before bariatric surgery. This implies to consider some good practice examples:

- A **preoperative period of at least 3 months** between the first consultation focusing on surgery and the bariatric operation (except in case of urgent medical reasons); the KCE proposes to include the measurement of the time elapsed between the first consultation and the bariatric operation among the list of indicators to be monitored in a registry (or register the date of the first information session to which the patient participated during the first consultation in the electronic patient record). In outlier centres (where the duration is systematically shorter or longer than 3 months) an audit of the content of pre-surgical care should be prioritized. Beside the duration of preoperative phase, it is crucial to define the different steps to be followed according to the patient's characteristics and the quality indicators to be filled by a "good" preoperative pathway.
- The use of **different communication and support channels** (e.g. written information, group meetings with other patients, local patient support groups, online forums and websites) to inform and prepare each patient to the required lifestyle changes on the long term.
- A specific approach (individual rather than group sessions, involvement of a member of the patient's social or family network in the discussion, etc.) to **vulnerable patient** (e.g. low socio-economic level; limited cognitive skills).
- An **assessment** of the patients' ability to engage in the process of behaviour change and long-term follow-up and understanding of the provided information as an inclusion criteria.
- A **thorough discussion** between the healthcare professionals, the patient (and family members as appropriate), documented in the patient's record. It can be considered that a document is signed (**engagement agreement**) by the patient and the multidisciplinary team in which the patient specifies that he will attend follow-up consultations.

Post-operative period

The KCE proposes to increase the patient's commitment in the post-operative period through several elements:

- To offer a **stepped-care approach** where the intensity of the follow-up (e.g. number of consultations with the dietician or psychologist) is adapted to the needs of the patients (cf.6.3.4)**.**
- To provide access to the patient of behavioural/education health experts and coaching.
- To give **access to currently non-reimbursed** products (vitamins), or increased reimbursement (e.g. lab tests) for patients who respect the first follow-up appointments.
- To use **practical tools** supporting the patient to adhere to the follow-up and to maintain the appropriate behavioural changes in the post-operative period (e.g. connected scale, daily food intake journal, smartphone application).
- To **give patients' access to digital communication tools** (e-mail, video or telephone consultations…) in order to minimize barriers regarding appointments such as time, distance, and cost.
- To appoint a **coordinator** in each centre (cf. 6.3.2) for the first 2 years and to hand over the follow-up to an identified GP afterwards.

To include expertise from patients besides that of professionals in designing the local care pathway. This co-design process has to meet specific prerequisites (e.g. education of both patients and healthcare professionals; careful selection of patient representatives) in order to be succesful.

Population awareness

In order to decrease stigmatization and create awareness about the magnitude and severity of the problem, the KCE proposes to **inform the population** (e.g. through media campaigns) about obesity (prevention and management, causes and impact) as well as on the place and implications of bariatric surgery.

Need of an informed consent

One concern in bariatric surgery is the importance of adherence to the lifestyle changes to ensure that bariatric surgery is successful on the long term. Motivation is an important factor in realising behavioural change in patients. This essential behavioural change should be encouraged starting from the preoperative stage, because it helps, according to the participants, to ensure an increased quality of life, less negative side-effects and a more positive attitude to life in general (see Chapter 5).

This implies a real patient' engagement, starting by a **thorough discussion** between the surgeon or the hospital/centre bariatric specialist and the patient, with his/her family as appropriate. Understanding of surgery options, risks and benefits, and acceptance of lifestyle modification, including behavioral changes and follow-up compliance are important points of discussion. Several guidelines emphasize the importance of a truly informed consent in the decision making process for bariatric surgery. NICE, for example, recommends that the process followed to obtain informed consent be documented in the patient's file and that the patient signs a declaration of commitment for the postoperative phase (See Chapter 4). Belgian healthcare professionals also propose that patients are asked to sign a kind of contract in which he commits himself to attend follow-up consultations (See Chapter 3).

In the literature, authors suggest to identify the unrealistic expectations of patients, look for positive factors of adherence (including social support) or estimate past compliance (meeting appointments, taking prescribed drugs...). Before being eligible for surgery, patients must be able to verbalize the fact that they will have to be an actor in their care and are committed to the recommended behavior changes (See Chapter 4). A specific approach

(for example individual rather than group sessions, involvement of a member of the patient's social or family network in the discussion, inclusion of a responsible caregiver in education sessions, provision of instructions in simpler language, etc.) for vulnerable patients (e.g. low socio-economic level; limited cognitive skills) is also suggested in the literature.

At the end of the preoperative phase, it is important to ensure that each patient has **fully understood** the information and is able to be an active participant in one's own care with **commitment** for follow-up (see Chapter 4). GP's can support the transfer of information (see point 6.4).

Preoperative period is relatively short

In Belgium, the duration of the preoperative phase is highly variable (See Chapter 2).The time between the first consultation in the bariatric centre and surgery is lower than 4 months in a majority (63%) of cases. This period reaches more than 6 months in less than 5% of the patients.

Belgian patients report that when they have taken the decision to be operated, they prefer to be operated as quickly as possible. Most of them have already followed a long process (e.g. several unsuccessful weight loss attempts) and consider bariatric surgery as "the solution". In retrospect however some patients mention that a longer and more careful preparation would have been more appropriate for them to be able to adopt the necessary lifestyle changes (See Chapter 3). In the literature and in some countries analysed, a preoperative phase of at least 6 months is suggested (e.g. in France) (See Chapter 5).

During the expert meeting (16/12/20219), it appeared that experts are not really convinced (56% agree or strongly agree) that 6 months has to be required in all cases. Instead of a duration of minimum 6 months, it is important to define the steps to be followed according to the patients' characteristics (age, co-morbidity, diet history…) and the quality indicators to be filled by a "good" preoperative pathway. This should be integrated in the 'consensus-based' guideline (e.g. for young girls without a true experience of previous rigorous diet a minimal time can be considered in a guideline but not as a legal criterion).

Insufficient information

Moreover, according to the literature (Chapter 4), the Belgian physicians and other HCPs (Chapter 3), information given to patients is not sufficient. Surgeons express that, despite information, the patient is not necessarily aware or capture that the operation is not an easy miraculous solution. In the patients' point of view, surgeons focus on the surgical procedure itself and on the postoperative medical aspects (e.g. possible complications and side effects) but not on the lifestyle changes and other post-surgery implications. Both patients and caregivers indicate that patients are not very receptive to information provided before the procedure because they mainly want to be "operated on as quickly as possible".

Patients also look for information on internet fora or turn to "Doctor Google", where they are at risk of getting false and sometimes dangerous information on which they build false expectations (Chapter 3). Additionally, patients often lack knowledge on the necessity of supplements and the importance of physical activities. Finally, some patients are also unaware of certain financial consequences (e.g. the cost associated with the need for vitamins or supplements; non-systematic reimbursement of reconstructive surgery).

A 'honey moon' phase ends after about 2 years

According to the patients and the literature (see Chapter 3 & 4), the weight loss is generally very satisfying during the first months. Problems start to emerge (e.g. weight regain, negative self-image, etc.) often around 2 years after the bariatric surgery (just when they are dropped out by the bariatric center). It is therefore important that specialized care is available at critical moments. These problems can be directly related to the bariatric surgery or to other life events (e.g. divorce, loss of a relative, problems at work) and encompass medical but also psychological aspects (e.g. alcohol addiction, depression, suicide idea). Patients need empathic and holistic support which requires a well-organized follow-up (with an identified coordinator at the bariatric center for the first 2 years and in the primary care (one GP) afterwards.

Decreasing adherence to lifestyle changes over time

In the literature it is indicated that lifestyle changes often decrease on the long term: because they are time consuming and can be cognitively challenging, etc. This can lead to several problems (weight regain, nutritional deficiencies, addiction (alcohol, drugs…)

Belgian physicians and other health care professionals (see Chapter 3) mention additional reasons for the high attrition rate in Belgium (certainly after the first year after the intervention) such as:

- The great freedom of choice of patients does not facilitate a real engagement of the patient in one's own care. Most patients are not referred to a bariatric center but go directly (e.g. after consulting social networks or listening to the experiences of relatives) to the centre of their choice. They ask to be operated in order to lose weight and too often see surgery as a "quick fix solution". They can go to another center if the requirements formulated by the initial center are too high (eg number of consultations with the dietician or psychologist; pre-financing of post-operative consultations) or if the contraindications to the intervention are too strict (eg eating disorders). This phenomenon is also called medical shopping. These patients chose the easy way and do not go to consultations unless problems arise. They do not realise/know that post-operative care could also prevent problems from arising in the first place.
- A significant weight loss during the first month leads many patients to underestimate the importance of post-operative follow-up. After a few missed appointments, or in case of difficulties, a "return" to the post-operative care pathway becomes difficult. In some cases, patients are also ashamed because of their weigth regain.
- The bariatric care pathway is a long-term care pathway and often not the only care pathway patients are going through (sleep research, cardiology, diabetes). Consequently, patients do not always have the required energy and resources to invest in their bariatric care.
- The focus of the follow-up is on the medical aspects while there is also a clear need for psychosocial and nutritional follow-up. More over when explanations of behavioral changes are given, they are often "technical" (eg what you can eat or not) while patients feel the need for practical advice on how to incorporate these changes In their daily lives,
- Consultations with psychologists and dieticians are not reimbursed and this can be an important barrier for some patients.
- There are a lack of patients' incentives to respect follow-up appointments. During the preoperative phase, there are legal obligations (e.g. consultation with a psychologist) but this is no longer the case after the intervention; in the post-operative period there is no "stick" to stimulate the patient responsibility. In addition, patients do not see the need of the follow-up because they feel themselves healthy after the intervention (especially the first two years). Bariatric centres are rarely pro-active in the patients follow-up either.

Motivation of patient: a crucial issue

The Belgian physicians and other HCPs consider motivation of patients to be a major issue, despite recent efforts of bariatric surgery centres and hospitals to ensure lifestyle changes in patients - such as group meetings, free or paid thematic workshops on psychology or dietetics, planning of follow-up appointments, sending of invitations/reminders. Patients should not only receive information but also be educated about nutrition, exercise and lifelong behavioural changes and adaptions (See Chapter 3).

Several strategies can support the patients' adherence to the lifestyle change and the follow-up requirements (See Chapter 4).

A **stepped care-approach** where the intensity of the follow-up (e.g. number of consultations with the dietician or psychologist) is adapted to the needs of the patients.

- Since the preoperative phase, in addition to the brochures given during the consultations, it is advisable to provide other means of information transfer. A wide range of **educational supports** is proposed in the literature: group sessions organised by the bariatric centre with operated patients are particularly emphasised because they allow patients to exchange experiences with peers (under the supervision of professionals) during group meetings which family members could also attend. According to the Belgian HCPs and patients, group sessions are very motivating for patients and allow them to offer support and

motivation to one another. Patients involved in those groups return more often for consultations with paramedics. In the Netherlands, most centres require that patients accepted for surgery at least 6 sessions education / coaching / etc.) before they can be operated (Chapter 5).

Other potential educational supports are local patient support groups, interactive websites such as http://www.wlsinfo.org.uk/ and http://www.bospauk.org/ or online official forum which is managed and moderated by specialists in bariatric surgery.

Access to **behavioural health (or educational) experts** and involvement of health care professionals with strong communication skills within the MDT can be useful. According to the literature, behavioural health experts can monitor health behaviour adherence, address negative cognitions and emotions that can occur, and use motivational interviewing and behavioural problem solving to address barriers before and after surgery.

Patient coaching is another proposition mentioned in the literature so that, for example, physical activity or healthy eating (e.g. cookbook, cooking workshops) can be integrated into daily life.

- **Practical tools** can be useful such as notebooks (daily food intake journal and exercise diary) to be filled in by the patient or electronic and remote monitoring of clinical parameters (weight, glucose, cardiovascular status) or even a smartphone application combining the delivery of care information to patients bariatric (such as dietary advice), appointment reminders, recording their progress and connecting to the healthcare professional if necessary.

An effective and individualized **coordination of the care** over the long term (> 5 years) is recommended. (see 6.4).

Regarding attendance to the follow-up appointments, **digital communication tools** (e-mail, video or telephone consultations…) could be used to minimize barriers such as time, distance, and cost. According to the literature, they combine advantages that are easily accessible, and available to the patient indefinitely (Chapter 4).

- **Reimbursement** of vitamins and consultations is proposed by Belgian physicians and experts to support lifestyle changes. By reimbursing consultations the threshold for seeking out professional help can be lowered (Chapter 3).
- **Financial incentives are** a solution element proposed by the interviewed physicians to reduce the attrition of patients postoperatively and encourage them to respect their follow-up appointments (e.g. giving access, to patients adhering to the follow-up, to non-reimbursed services such as psychological consultations or smartphone applications (Chapter 3). Offer pre-purchased care packs is another option found in the literature (Chapter 4).

Co-designing the patient care pathway

Another way to increase patients is to involve them actively in the design of the pathway. This implies that when the national model pathway (where patient representatives are also involved in the development group) is translated to the local level the bariatric centre not only use the expertise of healthcare professionals but also that of patients. This co-designing process is complex but rewarding. In order to be successful it requires that patients and professionals are educated to perform this job, that the right patients are recruited, that a culture is created in which this is possible, etc.[170 171]

Stigmatization by the population

During the patients interviews, it appeared that many of them feel to be stigmatized by family and friends about their obesity, as well as the past weight loss failures and the decision for surgery. This has a negative impact on their self-image and confidence. They sometimes feel ashamed about their condition. Moreover, some family members and friends see bariatric surgery as the “easy way out” as they are unaware that continued adjustments to diet and lifestyle are required to be healthy and to achieve a sustainable weight loss on the long-run (Chapter 3).

6.6 Payment system

6.6.1 Payment for consultations with a psychologist and dietician via the convention

The KCE recommends to include in the lump sum ('convention') that a bariatric surgery centre receives, the **consultations with dieticians and psychologists**. When the 'convention' is developed a calculation based on the caseload per centre and the number of consultations that is foreseen in the care pathway for each of the disciplines (including estimates of variable intensity of contacts among patients) has to be made. The starting point for this calculation is the nationwide care pathway. It contains at least:

- For dieticians: pre-surgery at least one individual consultation and post-surgery at least 4 consultations during the first year and 2 consultation in the second year;
- For a psychologist: pre-surgery at least one individual consultation (extended duration) and post-surgery at least 1 consultation per year;
- This number of consultations needs to be increased with additional consultations for a proportion of patients that require a more intense preparation for surgery and/or follow-up. These additional consultations can take place after 2 years when required.
- In addition time for information sessions in group needs to be foreseen.

The 'lump sum payment' gives the centres flexibility to allocate their budgets in function of the local situation and the patient' needs. Therefore, it is also important to monitor the results of the follow-up via the bariatric surgery registry.

An incentive for patients to adhere to follow-up appointments is the provision of multivitamins for free to patients that regularly attend their follow-up appointments.

The reimbursement of reconstructive and body contouring surgery after bariatric surgery needs to be further evaluated.

Currently no reimbursement for consultations with psychologist or dietician

In Belgium there is no reimbursement for consultations with psychologists and dieticians in the bariatric surgery pathway. Nevertheless, it is a legal obligation to be screened by a psychologist (or psychiatrist) during the pre-surgery pathway.

The implication of dieticians and psychologists in the care pathway is variable

In Belgium, the degree of the involvement and availability of both dieticians and psychologists in the multidisciplinary bariatric surgery teams is highly variable. When available, the intensity and duration of the consultations is often considered as insufficient. Moreover, patients indicate that they need more than 'technical information': coaching, support and treatment of underlying problems is often identified as a shortcoming. (See Chapter 3).

The interviewed healthcare professionals link the high variation in care (availability) to the lack of reimbursement. Indeed, it hampers the financial accessibility of care and contributes to the high attrition during the follow-up.

International guidelines consistently include consultations with dieticians and psychologists

Based on the analysis of the international practice guidelines (see Chapter 4) it can be concluded that consultations with psychologist and dieticians are integral part of the multidisciplinary care that bariatric surgery patients should receive. Both during the pre- and post-surgery team both disciplines are part of the core team.

During the pre-surgery pathway it is important that:

- Psychiatric and psychological contra-indications are detected (e.g. substance abuse, eating disorders) and (if possible) remediated. In addition, based on a psychosocial and behavioural screening an action plan can be developed tailored to each patient to increase the chances that he/she will adopt the necessary lifestyle changes in a sustainable way.
- A complete assessment of the nutritional/dietary behaviour and problems (e.g. diet histoty, macro- and micro nutrient deficiencies, eating patterns, mastification). In addition, tailored advice is given in relation to the feeding- and eating behaviour for each patient. The dietician (specialized in bariatric surgery) can use a checklist as a guide.
- It is clear that, in most cases, for most patients more than one consultation with both disciplines will be required.

During the post-surgery pathway it is important that:

- Each patient reeceives a psychological assessment (including the impact of surgery on psychological, social, familial/relational aspects of daily life) with the aim to determine if it is needed that a psychologist or psychiatrist gives additional support. This decision can be made within the multidisciplinary team after advice from the psychologist.
- The nutritional and eating patterns/behaviour of the patients is assessed by a dietician. The dietician proposes an appropriate diet, checks the compliance with the proposed diet and coaches the patient on how to integrate the necessary lifestyle changes in the daily life (e.g. providing practical tips, using apps/diaries as support).
- The intensity and frequency of the follow-up care by a dietician and psychologist is dependent on the need (stepped-care approach).

Support for lump sum payment

In the examples abroad a psychologist and dietician is an invariable part of the core team. Their level of involvement in the care pathway is dependent on the needs (based on an assessment and multidisciplinary concertation process). Centres dispose of a lump sum payment which allows them to pay the services of dieticians and psychologists in a flexible way. Eighty percent[uu] of the experts (16/12/2019) indicate that they agree that consultations of psychologists and dieticians are reimbursed. They are in favour to use a convention system (see text box; see point XX) to pay for the services of a multidisciplinary team. Yet, they indicate that it is important to monitor the results of the follow-up care via a bariatric surgery registry. They also support the idea to use some of the mechanisms used in the 'care trajectories' (see text box) to increase patient involvement and continuity of care (e.g. free multivitamins for patients that adhere follow-up consultations).

Body contouring surgery

Excess skin is a recurrent and prominent theme in the interviews with patients.(see Chapter 3) It is not only bothering them because of esthetical reasons. It is also causing physical discomfort. Many patients complain that they are not well-enough informed about the problem of 'excess skin' and the potential financial implications (lack of reimbursement for plastic and body contouring surgery). It is stipulated to be an important problem causing self-image problems. Recommendations about the reimbursement of body contouring surgery was out-of-scope from the present study. After all, this would require a cost-calculation. Therefore, it seems recommended to evaluate this need, which was clearly voiced in the present study, in follow-up studies.

[uu] 13% neutral

Box 9 – Conventions

Conventions are a payment instrument used in the Belgian Healthcare Insurance system in which different services for one specific disease/condition/problem are 'bundled' into one lump sum. A convention is an agreement between the financing authority (The National Institute for Health and Disability Insurance, RIZIV-INAMI) and the institutions providing care. Conventions are developed, installed and managed by the Board of Medical Directors, a body within the RIZIV-INAMI, gathering the Medical Directors of all sickness funds. Initially rehabilitations agreements ('conventions') were typically made with specialised rehabilitation and multidisciplinary care centres, like e.g. for musculoskeletal and neurological diseases and handicaps, or respiratory rehabilitation. However over the past decennia rehabilitations conventions have been developed for a large heterogeneity of (often chronic complex) medical conditions, transcending the field of rehabilitation.

Conventions can be standard (i.e. the terms of the agreement are the same for all health care centres), specific (i.e. the terms of the agreement differs between health care centres within the convention and the allocated lump sum is centre-specific and depends on the salary costs) or hybrid (i.e. the terms of the agreement are the same for all health care centres within the convention, but the allocated lump sum varies between centres). The content of the convention can vary but common elements are: specifications about the multidisciplinary team; eligible patients; financial resources, duration, governance and more and more also clear evaluation criteria.

Box 10 – Care trajectories

The care trajectories ('zorgtraject'/'trajet de soins') for 'chronic renal failure' and for 'patients with diabetes type 2 who no longer respond to oral treatment' were developed to enhance the collaboration in care between the patient, the GP, the specialist and other caregivers. The collaboration between the caregivers is described in a 'care trajectory' contract (duration four years) based on evidence-based practice guidelines. The GP has an important coordination role, the medical specialist a supportive role and the patient has an active role in the management of his/her disease. Financial incentives are given to the physicians (yearly lump sum of € 80 per patient for GP and medical specialist) and to the patient (complete reimbursement of consultations, access to self-management material, education sessions e.g. on dietetics, etc.). The consultations, however, are still reimbursed on a fee-for-service basis (FFS).

6.6.2 Conventions

The KCE recommends to use 'conventions' as a payment mechanism for the bariatric surgery care pathway. The aim is to limit bariatric surgery to centres that ensure that a multidisciplinary team with specialized expertise in bariatric surgery and obesity is responsible for patient selection and follow-up (at least 2 years for all patients and 5 years or longer for a subgroup of patients; and in collaboration with primary care).

The lump sum covers consultations with healthcare professionals (e.g. psychologist, dietician), multidisciplinary consultation, patient incentives (e.g. vitamin supplements), data-coding, coordinator, etc..

The surgical interventions as well as the medical consultations remain fee-for-service or part of low-variable care prospective payment. Yet,

- Bariatric surgery interventions are only reimbursed in centres when they are performed by surgeons with a specific expertise in bariatric

surgery (at least two per centre) in centres that receive a bariatric surgery convention.

A convention can only be assigned to a hospital site when the following criteria are met:

- Volume-thresholds for surgeons and hospitals (cf. 6.3.3)
- Composition multidisciplinary team (cf. 6.3.1);
- For each patient:
  - a multidisciplinary bariatric consult is organised;
  - a plan is drafted for the pre-surgery phase as well as for follow-up care;
  - a (preferrably GMD-DMG holding) general practitioner is identified. This GP is invited for the multidisciplinary consultation (possible via video-conference). This GP is also the professional to which the patient is referred after discharge from the follow-up care in the bariatric surgery centre. This discharge process can be phased, but in general the focus will shift after two years from follow-up by the bariatric surgery centre towards follow-up by primary care providers.
  - A participation in the national and compulsory bariatric surgery registry (cf. 6.7).
- A coordinator is appointed (organisation multidisciplinary consultation, monitor follow-up appointments patients, smoothen transfer from bariatric surgery centre to primary care follow-up);
- Capacity is available within the centre and/or in collaboration with primary care professionals to follow-up the patient for at least 5 years;
- Protocols based on the key interventions of a national care pathway are available (cf. 6.3.4).
- Functional collaboration agreements with primary care structures and centres for conservative treatment of obesity are made.

A steering committee including representatives from public authorities, sickness funds, healthcare professionals (including scientific and professional organisations), hospital- and primary care organisations is responsible to support and monitor the convention (e.g. evaluation phase; develop a registry and decide about the process- and outcome indicators and the minimal content of a nationwide care pathway).

The convention will have to be evaluated based on the quality indicators that are proposed by the steering committee.

Currently only a part of the care pathway is reimbursed

Currently only a part of the bariatric surgery pathway is reimbursed. The reimbursement is mainly limited to medical care (surgery, hospitalisation, consultations with physicians, home nursing, physiotherapy sessions, etc.). Despite the limited evidence, the analysis of the international practice guidelines and pathways (see Chapter 4) showed that there is consensus that consultations with dieticians and psychologists are required. In addition, physiotherapy sessions are indicated to increase physical activity with the aim to lose weight and prevent muscle loss.

Coordination of the care pathway

Patients, physicians and other healthcare professionals indicated that there is a need for coordination of care (see Chapter 3). Abroad this role is mostly assigned to a nurse (or clinical nurse specialist) or dietician. A coordinator is responsible for: the organisation of the multidisciplinary consultation, to prevent, monitor and limit follow-up attrition (e.g. actively approaching patients when they do not show up), organisation of the bariatric surgery registry participation, liaise with primary care, etc.

Stepped-care approach

Not all patients undergoing bariatric surgery have the same care needs. Based on the international care pathways and practice guidelines a stepped-care approach is recommended (see Chapter 4). This means that all patients are assessed by the multidisciplinary team (e.g. psychologist, dietician, and endocrinologist). Based on this assessment the intensity, frequency and duration of follow-up appointments is decided (by the multidisciplinary team with the patient as active partner). For some patients the focus will be on individual consultations while for other this can be organised via group sessions.

Lump sum payment

Also abroad the bariatric surgery centres (e.g. The Netherlands, Sweden, and England) receive a lump sum payment. This budget is used by the centres to establish a multidisciplinary team (e.g. dietician, coordinator, psychologist, physiotherapist, clinical nurse specialist) responsible for the pre- and post-surgery pathway.

GP as partner

The GP (and in fact the entire primary care) is not or only in a limited way involved in the bariatric surgery pathway.(cf. 6.4) However their input is expected by patients, bariatric centres and healthcare professionals.

Care pathway needs to be standardized but with the possibility to tailor care to patient needs

As described above the care for bariatric surgery patients is highly variable: e.g. degree of rigor of (multidisciplinary) decision making process about surgery; composition and expertise multidisciplinary teams; intensity, frequency and type of follow-up care etc.

To decrease variability and improve quality a nationwide care pathway (consensus about key interventions) need to be developed. Bariatric surgery centres will have the flexibility to implement them via local protocols.

Need for a registry

The consulted experts (see Chapter 3; and 16/12/2019) agree that participation to a nationwide bariatric surgery registry (funded by public authorities) should be made compulsory. This would allow to monitor process- and outcome-indicators. The current legal criterion (i.e. the obligation to have a registry) is insufficient.

Convention as payment mechanism

A convention is a payment mechanism allowing to combine a degree of flexibility with standardization of care. 94% of the consulted experts agree to use a convention as payment tool to restrict bariatric surgery to centres that meet pre-defined criteria (e.g. the multidisciplinary team; agreements with primary care; mandatory nationwide registry participation).

6.6.3 Pilot projects[vv]

The KCE recommends to start with pilot projects (context of article 56 from RIZIV-INAMI). This includes that the modalities of the convention are tested in a selection of centres before to proceed with a nationwide implementation.

When selecting pilot projects, the following criteria need to be considered:

- The bariatric surgery centre meets the criteria as specified in the (future) convention (cf. 6.6.2);
- A functional collaboration agreement with primary care and centres for the conservative treatment of obesity exists. These include agreements on multidisciplinary bariatric consultations (e.g. patient

[vv] Note that the Board of Directors of the KCE with all relevant stakeholders and decision makers represented assessed that there are enough elements in the report to start with conventions directly and omit the phase of pilot projects. Therefore this reform proposal was removed from the final policy recommendations.

selection, follow-up), (back) referrals following shared care model; bariatric registry contribution, etc.

- A variation of types of centres (teaching hospitals versus general hospitals;)
- The evaluation focuses on the feasibility; barriers and facilitators of the criteria as specified in the convention. This evaluation should enable to fine-tune the convention prior to nationwide implementation.

The current study clearly demonstrates shortcomings and variability in the care for bariatric surgery patients. In addition, several solution elements emerge. To improve the organisation and payment of the bariatric surgery it is suggested to start with pilot projects (covering the range of different hospital types: rural/urban; teaching versus non-teaching hospital). This will allow to test the barriers and facilitators of the criteria included in the convention. Such a feasibility study will allow the fine-tuning of the convention prior to nationwide implementation. The RIZIV-INAMI has a policy instrument (Art. 56 RIZIV-INAMI)[ww] to finance such pilot projects. The majority (79%) of the consulted experts (16/12/2019) agree to start with pilot projects.

6.7 Bariatric surgery registry

The KCE recommends to change the current legal obligations for a mandatory bariatric registry with the aim that each centre (that complies with the criteria for bariatric surgery) is **obliged to participate to the nationwide, uniform bariatric surgery registry to the model of Sweden and the Netherlands.**

The RIZIV-INAMI funds an independent organisation (e.g. Sciensano) to implement, manage and monitor the registry. The governance structure of the registry includes healthcare professionals (e.g. professional organisations of bariatric surgeons and allied health professionals), public authorities, patients and representatives of sickness funds. **The funding includes:**

- ICT infrastructure;
- Central support for audit and feedback, and evaluation of bariatric surgery centres (e.g. monitor criteria convention);
- Staff responsible for coding and data input (possibility to upload data in batch from the electronic patient record).

The content of the registry is in accordance with the current international initiatives (i.e. Sweden, the Netherlands) and allows to monitor process- and outcome indicators. The governance structure will have to monitor that the registration requirements are in balance with its applications. The specific content will have to be established by the governance structure, but contains at least:

- Patient characteristics (e.g. unique patient identifier [social security number]; date of birth, gender)
- Results screening and assessment (e.g. height, weight, comorbidities)

[ww] https://www.riziv.fgov.be/webprd/docleg/sp/234981-506?1&tmpl=kartlis&OIDN=1500056&-VIEW=1&-DTRF=31/08/2001#567

- Bariatric surgery intervention (e.g. date, type, hospital)
- Follow-up (e.g. comorbidities, complications, weight, patient-reported outcome).

The registry includes data:

- About the pre-surgery pathway starting from the multidisciplinary consultation;
- Until 5 years post-surgery (at least 1 time per year).

The results of the care (process- and outcome indicators) are part of the evaluation of the care offer (revision of the convention: e.g. content convention, assigning and continuation of the convention to centres). A public reporting of these results can be considered.

The registry is managed by the bariatric surgery centre but also involve primary care (e.g. follow-up appointments).

The current obligation to keep a registry is largely insufficient

The current legal obligation to hold a registry is largely insufficient. This obligation includes that hospitals that perform bariatric surgery keep the data that they need to fill out on the notification form of the sickness funds in a registry:

- Date multidisciplinary consult with indication for surgery;
- Type of bariatric surgery;
- Indication (BMI [height; weight; date]; additional criteria: diabetes; treatment resistent hypertension; sleep apnoea)
- Re-intervention.

An audit showed that such a registry is missing in 32% of the audited hospitals. Moreover, the registry (in its current form) is not suitable for research nor for policy purposes. After all, there is no obligation to share data in a central registry. Hospitals only have to be able to show that they keep the data in an electronic file.

Past efforts to start a registry failed

Bariatric surgeons already took several initiatives to develop a uniform registry for bariatric surgery. Yet, all these efforts did not result in a nationwide registry where centres keep data about bariatric surgery patients in a systematic way. Due to a lack of support from the public authorities (funding, capacity for analysis and feedback, etc.) these initiatives remained to small-scale to enable to support policy initiatives.

Administrative databases can complement registries but not replace them

The analysis of administrative data (e.g. IMA-AMI data: billing data; MZG-RHM: the Belgian Hospital Discharge Dataset) yields useful insights (e.g. utilization patterns; geographical variation) but do not allow to monitor quality of care (e.g. weight loss, comorbidities, complications, side effects) on a long-term basis. These data sources can be used to complement a registry (e.g. to cross-validate a registry) but have too many limitations to be used to monitor the quality of care for this population (i.e. time-lag before they become available, hospital-episode oriented; vulnerable for up-and under-coding).

A central registry as a key-element in the reform

The interviewed bariatric surgeons (see Chapter 3) identify a ‘central and mandatory bariatric surgery registry’ as a key component in the reform of bariatric care in Belgium. A registry requires adequate funding (data-input; audit; analysis; feedback) and has to be used for feedback and benchmarking purposes. Data-input is the responsibility of the bariatric surgery centre but agreements can be made with primary care providers.

Registries from the Netherlands and Sweden can serve as an example

Also abroad registries are developed to support the policy around bariatric surgery care organisation (see Chapter 5). This varies from voluntary registries without funding (e.g. France: initiative from the professional organisation of bariatric surgeons) to mandatory registries with central funding, feedback and public reporting (e.g. Sweden and The Netherlands). In England the registry is managed by a for-profit organisation which entails

some risks (e.g. privacy and data use). In the Netherlands (non-profit organisation supported by the healthcare insurers) and Sweden (public authorities) the registry is used to monitor quality of care (e.g. caseload; % patients with severe complications; weight loss; adherence to follow-up; quality of life) in the bariatric surgery population (>98% of the operated patients are in the registry). Factors contributing to a successful registry are:

- Central uniform registry with financial support for bariatric surgery centres (e.g. data-input) as for central capacity (audit, analysis, feedback);
- Mandatory character and condition for reimbursement;
- Governance structure with representatives of the public authorities (healthcare insurance) and healthcare professionals (bariatric surgeons and other healthcare professionals);
- Simple data-input (e.g. in batch extractions from the electronic patient record) and a system for audit (coding quality and completeness);
- Use of quality indicators to evaluate and adapt the care offer (e.g. In the Netherlands the registry is used for selective contracting purposes).

It is interesting to highlight that 100% of the consulted experts (16/12/2019) are in favour of the development of a mandatory nationwide registry.

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